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# THE NATURAL WEALTH OF CALIFORNIA.

THE

# NATURAL WEALTH

OF

# CALIFORNIA

COMPRISING

EARLY HISTORY; GEOGRAPHY, TOPOGRAPHY, AND SCENERY; CLIMATE; AGRICULTURE AND COMMERCIAL PRODUCTS; GEOLOGY, ZOOLOGY, AND BOTANY; MINERALOGY, MINES, AND MINING PROCESSES; MANUFACTURES; STEAMSHIP LINES, RAILROADS, AND COMMERCE; IMMIGRATION, POPULATION AND SOCIETY; EDUCATIONAL INSTITUTIONS AND LITERATURE; TOGETHER WITH

A DETAILED DESCRIPTION OF EACH COUNTY;

ITS TOPOGRAPHY, SCENERY, CITIES AND TOWNS, AGRICULTURAL ADVANTAGES, MINERAL RESOURCES, AND VARIED PRODUCTIONS.

BY

TITUS FEY CRONISE.

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# INTRODUCTORY.

The Publishers present this work as the most recent, comprehensive, and elaborate treatise upon the history, geography, geology, natural history, climate, population, wealth, industry, products, and resources of California. Unusual pains have been taken to insure its acceptance as a work not alone of passing interest, but as a standard authority on all the subjects it embraces.

There is a strong demand for such an authority, both for the purposes of local information and reference, and for citation and general use abroad, where, for many reasons, much attention has recently been attracted to our State. The successful establishment of mail steam communication with Japan and China; the acquisition of Alaska; the near completion of the Pacific railroad; the remarkable increase of our agricultural products and exports, enabling California to compete profitably with the foremost wheat countries in the markets of Europe, are circumstances that have, within the past twelve months, caused more particular inquiry to be made concerning the State than ever before. It is no longer looked upon as the isolated abode of a nomadic and somewhat lawless community, absorbed mainly in gold seeking, and generally indifferent to the healthy pursuits and noble concerns of life—but as a well-ordered commonwealth, prolific in natural resources and capacities beyond all its sisters; favored by a delightful climate; advancing in substantial prosperity; attesting the fertility of its soil by a wheat crop approximating in value its yield of gold; and rivaling two zones in the variety of its other products. It is seen to be the nucleus of a great empire on the Pacific, already adjoined by States and Territories of remarkable characteristics, and laying a train of causes that will some day shift the currents of commercial and monetary exchange.

Hence it is desirable to collate in one volume a reliable statement of the salient facts concerning a region of so much interest; to make such a compilation as will serve as a magazine for the use of all who have occasion to write or speak about California, and which, when drawn upon by journalists abroad for popular articles, will disseminate correct information and ideas where these are most needed and will have the most beneficial effect. While this work has been prepared in a spirit of natural pride, everything like exaggeration has been guarded against. The material facts are set forth with plain speech, and often with statistical brevity—the reader being left, in most cases, to draw his own conclusions. The grand aim has been to give full and correct information—not to argue or commend.

Those who are most anxious for the rapid peopling and development of the State should desire no more than the accomplishment of this aim, which must supply the most effective of all arguments—those derived from the irrefutable logic of facts.

In pursuance of the ideas above set forth, the author has drawn upon every reliable source of information; has employed the best ability in original researches, and has collated a large amount of valuable matter not before printed. The whole material in the book, which embraces over 700 imperial octavo pages, has been gathered and written within a year—much of it within a few weeks of publication; so that the very latest official and other data have been availed of to make each department as fresh and complete as possible. The author has been assisted by a corps of specially qualified gentlemen, who have established reputations as statisticians, scientists, and writers on subjects of practical and economical interest, and most of whom have brought to this work the best results of years of experience and observation.

The division of the work comprises a variety of subjects, some of which may be mentioned here to afford an idea of the scope of the book: History, 70 pages; Geography, 20 pages; Description and Statistics of the Counties, separately, 237; Climate, 21; Agriculture, 43; Geology, 37; Zoology, 67; Flora, 27; Mining and Metallurgical Processes, 34; Mines and Mining, 34; Manufactures, 47; San Francisco, 23. Among the miscellaneous topics treated are the following: Immigration; Population; Literature; Educational Matters; Railroads; Petroleum; Shipbuilding; Telegraphs; City and County Finances; U. S. Branch Mint, etc.

A very brief review of the more striking facts referring to California will be enough to satisfy those who may wonder at such an expenditure of literary labor upon our State, that it is entirely justified.

California's seven hundred miles of length, by about two hundred of width, embraces the same nine degrees of latitude which, on the Atlantic side of the continent, include the extensive and populous country stretching from Charleston, S. C., to Plymouth, Mass., a region occupied by portions of ten or twelve States. Within these limits, is an area of nearly 160,000 square miles—greater than the combined area of New England, New York, and Pennsylvania, or that of Great Britain and Ireland, with several minor German States thrown in. The outline of this great State on the map resembles that of an oblong trough, the Coast Range on the westward, or ocean side, and the Sierra Nevada on the east, with their interlocking extremities forming the rim, and enclosing a series of level valleys remarkable for their fertility, once basins of water, salt or fresh, now filled with the washings of uncounted years, but still subject to occasional partial floods. The mountain walls themselves are broken into innumerable smaller valleys, level like the others, those in the Coast Range being the largest and loveliest, and only slightly elevated above the ocean, those of the Sierra Nevada, and especially at the sources of its streams, and between its crest of double summits, attaining an elevation of from 3,000 to 7,000 feet, and enclosing charming lakes.

Although this State reaches to the latitude of Plymouth bay on the north, the climate, for its whole length, is as mild as that of the regions near the tropics; half the months are rainless; snow and ice are almost strangers, except in the high altitudes; there are fully 200 cloudless days, every year; roses bloom in the open air of the valleys through all seasons; the grape grows at an altitude of 3,000 feet with Mediterranean luxuriance; the orange, the fig, and the olive flourish as in their native climes; yet, there is enough variety of climate and soil to include all the products of the northern temperate zone, with those of a semi-tropical character. The great valleys of the interior yield an average of 20 to 35 bushels of wheat per acre; crops of 60 bushels are not uncommon, while as high as 80 bushels have been known on virgin soil under the most favorable circumstances. The farmer loses less time here than in any other portion of the United States, or in any country of Europe.

It is remarkable that with these genial characteristics blends some of the grandest mountain scenery in the world. The Sierra Nevada contains the highest peaks known in North America. In its northern portion stands Mount Shasta, 14,440 feet high, and towering seven thousand feet above all surrounding peaks. In its southern portion, however, where the main chain attains its greatest general height, Mount Whitney rises about 15,000 feet, and is surrounded by a close congregation of 100 peaks, which are all above 13,000 feet, while the embracing region, for 300 square miles, has an elevation of 8,000 feet. Beside these figures the Alps become inferior. The Yosemite gorge has a world-wide celebrity for its granite walls, which rise perpendicularly as high as 4,400 feet, and over which tumble river currents that break in foam on the blue air, or sway in the breeze like veils of lace. In this splendid range occur those gold deposits, the most extensive ever known, which have yielded in twenty years $850,000,000, and are still yielding over 37 per cent. of the whole annual gold product of the world, or 10 per cent. more than Australia. In this range, or its offshoots. are also found mines of silver, copper, iron and coal, with smaller quantities of numerous other metals and minerals. Here are also the finest coniferous forests of America, including several groves of the largest and oldest trees in the world. More than all this, a large portion of the Sierra Nevada, rugged as it might seem to be from this description, is well adapted to cultivation and settlement; its lower ridges, its depressions and foot-hills, having a productive soil, and being accessible by good wagon roads, in some places by railroads already built or projected, while the mining communities furnish good markets. Agriculture in the mountain districts is becoming a striking feature of the industry of the State, and it is believed that for grape and fruit raising the high lands will hereafter be generally preferred. Many of these remarks are also true of the Coast Range, where mountains 3,000 feet high are often clothed to their summits with a thick growth of wild oats, which furnish excellent pasture and hay; where the valleys are rich and picturesque, and where quicksilver, salt, sulphur, borax, and splendid redwood timber are found in abundance.

When such facts as the foregoing are recalled, it would seem strange that California hardly increased its population for many years, if we did not reflect how remote and isolated it has been from the great hives of the East, how little has been known abroad about its best qualities, and how fatal were the early vagabond mining methods and habits to permanent prosperity. Yet, for a community never exceeding from 400,000 to 500,000, all told, scattered over an area large enough to support 30,000,000, and beginning twenty years ago with but a handful of Caucasians, California has accomplished a great deal. If its gold product has fallen from $65,000,000 per annum to $25,000,000, its agricultural products have increased to an amount equal to half the largest gold yield ever known. The wheat crop alone, for 1867, was worth nearly as much as the gold, and the surplus of this staple freighted 223 ships, and reached a value of $13,000,000; while the total exports of home products, including about fifty different articles for which the State was formerly dependent on other lands, was about $17,000,000. The vintage of 1867 exceeded 3,500,000 gallons of wine and 400,000 gallons of brandy, the number of vines now growing in the State being about 25,000,000. The wool clip was 9,500,000 pounds, showing a gain of more than thirty per cent. over 1866. Silk, tobacco, hops, flax and cotton may now be ranked among the minor products that promise to be hereafter sources of profit. A silk factory and a sugar-beet factory are two of the new industries being established. The manufactures of the State are already estimated at $30,000,000 per annum. The best mining machinery in the Union is made here. The assessed value of real and personal property increased in 1867 about $21,000,000, running up the total taxable values of the State to some $221,000,000, and showing a gain of twenty per cent. in two years, the most prosperous years ever experienced in the State. It may be said that the genuine prosperity of California is only just begun. So long as a greater part of its population was engaged in surface mining there was little substantial gain, either materially or morally. The transition period to more regular and diversified industry was one of trial and discouragement; but it is nearly over, and on every hand may be seen the signs of improvement, in commerce, manufactures, agriculture and society. Mining itself is becoming a fixed pursuit, regulated by science, skill, and capital. One third of our gold product is now obtained from quartz veins worked by machinery, and this proportion is steadily increasing. Railroads are rapidly multiplying in the State. Within twelve months San Francisco will be connected by rail with all the principal towns of the interior, at distances from 50 to 200 miles, north, south or east, and with the Great Basin of Nevada and Utah, by the Pacific railroad. Telegraph lines ramify from the metropolis to all parts of the interior, connecting with British Columbia and every State in the Union.

The running of two lines of steamships to Panama, and others to Mexico, British Columbia, Alaska, the Sandwich Islands, Japan and China, has greatly increased our commerce and quickened immigration. A sound metallic banking system is in secure operation.

The State funds for educational purposes now aggregate nearly $1,000,000, and the interest upon this, with the aid of school taxes, supports an admirable system of free instruction. The means and the measures are ready for establishing a State University on a broad and permanent basis. The penal and benevolent institutions maintained by the State have been improved considerably, the latter, especially, being quite creditable, and including provision for the insane, the deaf and dumb and blind, the orphaned, and the youthful wrecks of society. Besides these, there are numerous and varied local establishments in San Francisco, which minister to the miseries and wants of the entire State with impartial charity.

The future of California is very bright, and those who have been faithful to her through nineteen or twenty years of remarkable vicissitudes and hardships, may well rejoice in the prospect. Yet, there are some evils and disadvantages which need to be frankly considered. Habits of lavish expenditure, lack of repose in social manners, recklessness in business, undue haste to be rich, want of restraint over the young, too great indifference to the solid essentials of character in public and private, a hard materialism ; these are traits which Californians, with all their spasmodic, though hearty generosity, exhibit too frequently. This criticism is less applicable to all the larger centers of population, however, than it would have been a few years ago. The growth of the family influence and of the sentiment of attachment to the State, has been quite rapid. Society is crystallizing into perfect forms ; homes have multiplied ; domestic pleasures and moral restraints are generally more powerful than frontier vices, and the most intelligent travelers concede that for pleasantness of home surroundings, and regard for all the ordinary sanctities of law and religion, society in the populous centers of California compares favorably with that at the East, while it has undoubtedly escaped the worst effects of protracted war and financial disturbance. Such asperities as remain here and there will be toned down by the lapse of time, the concentration of a more stable population in the mining districts, the homogeneousness that will come with a larger native infusion ; but it is worth while to try and subdue them earlier, and to cultivate even more assiduously than we do the quiet domestic traits that make the beauty and the sweetness of Home.

A difficulty of another kind is found in the uncertain tenure of real estate, and the tendency to retain land in large tracts. This, however, is less apparent than it was a few years ago. Nearly all the Spanish titles have been finally adjudicated, and fair progress is making in settling the many vexatious disputes as to the large tracts of land granted by the United States Government, which the State authorities too hastily and carelessly put into market. Large bodies of land are coming into possession of railroad companies; but under the regulations adopted by Congress, these cannot be withheld from occupation, even if it were not to the interest of the grantees to sell them. Many holders of Spanish grants, which embrace some of the most extensive and fertile districts, could greatly benefit the State, and themselves, by dividing these estates into small farms and selling them to actual settlers at a fair price. It will be a grand day for California when the word "ranch," like the idea and system it represents, has only a historical meaning, and when small farms, well tilled, dot the lovely plains now abandoned to herds of cattle. The floods and droughts of 1862, '63 and '64, compelled many ranch owners to adopt the sensible policy above recommended; and if all would do so to the extent of offering half or two thirds of their property in alternate lots, they would grow wealthy on the remainder, and help to enrich the State.

In conclusion, the publishers of the Natural Wealth of California submit it to the public with the earnest wish that its chief aim, which is to help California in the direction of a substantial and healthy progress, may be fully realized.

The author desires to make especial acknowledgment to J. G. Cooper, M. D., of the State Geological Survey; to Henry Gibbons, M. D.; and to Mr. J. S. Silver, for valuable assistance rendered by them in the several departments of Zoology, Climate, and Agriculture.

Prof. B. Silliman, Dr. Louis Lanszweert, Messrs. Henry DeGroot, Monroe Thomson, T. A. Blake, W. A. Goodyear, F. Bret Harte, and Wm. Henry Knight, have also aided in the preparation of material for this volume, and the author's thanks are due to these gentlemen for the efficient manner in which their duties have been performed.

San Francisco, March 31, 1868.

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### THE

# NATURAL WEALTH OF CALIFORNIA.

## CHAPTER I.

### EARLY HISTORY.

Introduction—Origin of the Name—By Whom Discovered—The Changes in its Boundaries —The Missions—their Beginning and End—The Aborigines of California—The Early Settlers—Commerce of California while under Spanish and Mexican Rule—The Acquisition of California by the United States.

This book, being more particularly intended as an exhibit of the natural wealth of the State of California, makes no pretensions to being a history of the Pacific Coast; but the two subjects are so intimately blended, that it is not possible to write about one without referring to the other. The limits of the portion of the work proposed to be devoted to the historical branch of the subject, compel us to confine ourselves, as much as possible, to facts and events connected with that portion of the coast embraced within the boundaries of this State—a somewhat difficult task, as, until a comparatively recent period, the whole country, from the boundaries of South America, to the late Russian possessions on the north, and from the Ocean to the Rocky Mountains, was included in California.

### ORIGIN OF THE NAME.

There are few countries, the origin of the name of which is involved in as much mystery as that of California. A compound of Greek and Latin, it is not positively known by whom or when compounded; nor the reason why, although many profound scholars in Europe and in the

United States have endeavored, during the past century, to trace its origin. It is first met with in a once popular, but now almost forgotten romance, entitled "The Sergas of Esplandian, the son of Amadis, of Gaul," published at Seville, (Spain), in 1510, in which it occurs three times. In one passage, thus:

"Know that on the right hand of the Indies there is an island called California, very near to the Terrestrial Paradise, which was peopled by black women, without any men among them, because they were accustomed to live after the manner of the Amazons. They were of strong and hardened bodies, of ardent courage, and of great force. The island was the strongest in the world, from its steep rocks and great cliffs. Their arms were all of gold, and so were the caparisons of the wild beasts they rode."

Another passage reads:

"In the island called California are many griffins, on account of the great savageness of the country and the immense quantity of wild game to be found there."

This romance was very popular in Europe, passed through several editions during the twenty-five years immediately preceding the discovery of this country, and it is quite possible that Hernando Grixalva —one of Cortez' officers to whom the honor of making that discovery belongs—or some of his companions, may have read it, and, finding what they supposed to be an island while sailing "towards the Terrestrial Paradise," along the coast of Mexico, which is "on the right hand of the Indies," they called it California—not because it answered to the description in the romance, but to secure an additional interest in the discovery, by giving it a name that possessed the attraction created by that popular work. They must have drawn on their imagination immensely, however, when adapting such a description to that portion of the coast first discovered, which is near the site of the present port of La Paz, in Lower California.

There is a tradition among the native Californians, that, in an expedition of the Spaniards against the Indians, in 1829, they found in the country between Tomales Bay and Cape Mendocino, a tribe in which the squaws had as much to say, and to do with the affairs of peace and war, as the men. These women are stated to have been stout and well made, and are remembered, in the old traditions, as "Los Amazones."

Where the author of the romance obtained the name, has not been ascertained. It is probable that he took the idea of the location of the "Terrestrial Paradise" from a letter, written by Columbus to Ferdinand and Isabella, many years previously, when the great navigator was about to make a voyage in the same direction as that followed by Grixalva, in which he informed his sovereigns that "he shall be sailing towards the Terrestrial Paradise."

It may be stated, in explanation, that long after the discovery made by Grixalva, California was considered an island. The peninsula was subsequently called the Island of Santa Cruz, and, more than a century afterwards, it was renamed the "Islas Carolinas," in honor of Charles II of Spain.

Some authorities insist that the name is derived from *calidus fornus,* two Latin words signifying "hot oven," giving as a reason for such an hypothesis, that it is a custom of immemorial antiquity, among the aborigines of this section of the coast, to use "hot ovens" called *temescal,* as a remedy for most of the diseases to which they are subject. Every tribe had one or more of these "hot ovens" near their villages. These "sweat houses" were quite familiar to the missionaries and early settlers, and may be found in many parts of the State at the present time. It is very probable that the earliest explorers may have seen some of them; and, because the natives used "hot ovens" to heal their bodies, may have called the country "a land of hot ovens, or *calidus fornus.*

Clavigero, who wrote a history of California many years ago, quotes the opinion of D. Guiseppo Compoi, a learned Jesuit, on this subject, who states that the name is derived from the Spanish word *cala,* which means "a little cove of the sea," and the Latin word *fornix,* "the vault, or concave roof of a building"—giving, as a reason for this extraordinary interpretation, that within Cape St. Lucas (near where Grixalva is supposed to have landed) there is "a little cove of the sea," near which there was a rock so worn by the waves, that its upper part was hollow, like "a vaulted roof," and from these circumstances its discoverers called the place *cala fornix,* which has since been softened down to California, and applied to the whole country.

A learned Greek scholar suggests that the name may have been compounded from the Greek words *kala-phora-nea,* signifying a beautiful young woman, or new country. Another Greek scholar suggests that it may be derived from *kala-phorneia,* signifying beautiful adultery. The application of such an interpretation is not very clear, though Powers' statue of California represents a beautiful, nude female, holding a bundle of thorns behind her, which is claimed to be an embodiment of this interpretation; but it may be quite as appropriate to explain such a figure by the seductive beauty of the country, and the disappointments so many of its earlier visitors encountered. It is quite clear that the Spanish explorers, who are credited with giving the name, had no acquaintance with the seductions that lured so many here in after years, because that portion of the country they applied this name to, is the most barren and uninviting on the coast.

Venegas, the most learned of all the early historians of the coast, in his "Natural and Civil History of California," published in 1758, states that the name was first used by Bernal Diaz, an officer who had served under Cortez, during the conquest of Mexico, and applied by him to a bay which he discovered during one of the earliest voyages. This learned historian objects to the proposition that the name is derived from *calida fornax,* alleged to have been given to it by the early navigators, on the very probable ground that these persons did not possess sufficient knowledge of the Latin to make such a combination.

There is still another alleged origin for the name, mentioned by Captain Beechey, in his account of his voyage to this coast in 1826, wherein he relates a conversation on this subject, between himself and Father Felipe Arroyo, who was at that time in charge of the Mission of San Juan Bautista. The worthy father is stated to have expressed his belief that the name originated from *colofonia,* the Spanish word for rosin; giving his reason for such belief—that the great number of resinous trees the discoverers of the country saw, when they landed, impelled them to exclaim: *colofonia!*—or rosin.

This story is so absurd, as to be almost unworthy of notice; but having been quoted by a gentleman who has obtained some reputation as an authority on California archæology, it deserves consideration. The fact that the portion of the peninsula where these discoverers landed, and to which it is admitted they gave the name, is one of the most barren, treeless sections of the coast, demolishes the whole story.

The records of the Jesuit Missions, on the peninsula, say the "extreme barrenness of the soil prevented the growth of trees of any magnitude." Father Ugarte, who built the first vessel constructed in California—*The Triumph of the Cross*—in 1772, had to haul the timber used in its construction "full thirty leagues from the river Mulege, where she was built," because there was none growing any nearer.

According to these records, the first discoverers had but little cause to exclaim "colofonia!"

It may be mentioned as a curious fact, although one not having any particular reference to this subject, that in Bavaria, and other portions of the south of Germany, rosin is called "Kalifornea," the word being pronounced precisely as we pronounce California. The origin of the German word it is out of our province to discuss. It is merely mentioned as a curious fact.

Webster thinks that the root of the name is probably the Spanish *Califa,* from the Arabic *Khalifah,* successor or to succeed, the Caliphs being the acknowledged successors of Mahommed.

The explanation of the origin of the natives of the country, under the head of aborigines, may throw some light on this subject..

Numerous other attempts have been made by writers in Mexico, the United States, and Europe, to explain the origin of this name; but the above are the best and most reasonable of such efforts.

## BY WHOM DISCOVERED, AND WHEN.

The territory which at present comprises the great State of California, was first discovered, and partially described, in the year 1542, by Juan Rodriguez Cabrillo, a Portuguese by birth, but at the time serving as pilot, or navigator, in the Spanish service. He also discovered and named the Farallones islands. Equipped for a voyage of discovery along the then unknown shores of the Pacific, under the auspices of Mendoza, the Viceroy of Mexico, Cabrillo sailed from the port of Navidad, Mexico, on the 27th of June, 1542. Keeping within sight of the shore, the greater portion of the distance, he reached as far as latitude 40° 30′, and longitude 124° 35′, when he encountered the great western headland, which he called Cape Mendoza, in honor of his friend and patron, the viceroy—but now called Cape Mendocino. This fact is almost all that remains on record to prove that Cabrillo was the discoverer of the country. He appears to have returned from the voyage on the 14th of the following April, without making any further discoveries.

It was supposed, for many years, that Sir Francis Drake, the famous English navigator, was the discoverer of California, as well as of the Bay of San Francisco. But, before the light of history, he is stripped of both honors, on the clearest possible testimony. Sir Francis, it is known, reached the Pacific Ocean through the straits of Magellan, on board the *Golden Hind,* in 1578, thirty-six years after Cabrillo had named Cape Mendocino. He was not aware of this fact; but, thinking he had discovered a new country, took possession of it for "Good Queen Bess," as was the custom in those days. It is clearly settled, that the place where he landed is near Point de los Reyes, latitude 37° 59′ 5″. Sir Francis marked it on his chart as in latitude 38°. The locality will probably be ever known hereafter as

Drake's Bay. The most conclusive argument that could be advanced, to prove that he did not discover the Bay of San Francisco, is found in the name he gave the country—New Albion. There is nothing about the entrance of this bay, to call up images of the "white cliffs of old England," so dear to the hearts of the mariners of that country. Its beetling rocks, must have been additionally dark and dreary at the season of the year when the great navigator saw them—neither green with the verdure of spring, nor russet by the summer's heat; while, near Point de los Reyes, there is sufficient whiteness about the cliffs which skirt the shore to attract attention, and "as it is out of the fullness of the heart the mouth speaketh," the "bold Briton," longing for home, may have pictured to his "mind's eye" some resemblance to "Old Albion." Besides, Drake lay thirty-six days at anchor, which it would have been impossible for so experienced a sailor to have done, had it been in our glorious bay, without being impressed with its great importance as a harbor, on a coast so destitute of such advantages as this; but he makes no allusion to any feature traceable in our bay. He never had the honor of seeing it.

In 1602, General Sebastian Viscayno, under orders from Philip III. of Spain, made an exploration of the coast of Upper California, in the course of which he discovered the harbors of San Diego, on the 10th of November. After remaining a few days, he proceeded to the north, and, on December 16th, discovered the bay of Monterey, which he named in honor of Gaspar de Zunniga, Count de Monte Rey, the then Viceroy of Mexico. It was at first called Port of Pines. Viscayno remained eighteen days at Monterey, and was much impressed with the beauty of its surroundings. He also discovered the islands which form the Santa Barbara Channel.

Forbes, in his "History of California," states that Viscayno, on this voyage, discovered the bay of San Francisco—a statement which is not supported by any other authority. It is possible that Forbes may have misinterpreted a passage from the diary of the voyage, which states that "in twelve days after leaving Monterey, a favorable wind carried the ship past the port of San Francisco, but she afterwards put back into the port of Francisco." As the diary further states that "she anchored, January 7th, 1603, behind a point of land called Punta de los Reyes, (which was named by Viscayno), where there was a wreck," there is no room to doubt that it was not inside the bay of San Francisco, which there is no proof that Viscayno ever saw. In 1595, Sebastian Cermenon, while on a voyage from Manilla to Acapulco, was wrecked near Punta de los Reyes. This was the wreck alluded to.

There is a work extant, written by Cabrera Bueno and published in Spain, in 1734, which contains instructions to navigators for reaching the "Punta los Reyes, and entering the port of San Francisco," which some authors consider the present bay; but the wreck of Cermenon's vessel near that point, and Viscayno's putting into that port, is tolerable evidence that it was not the harbor of San Francisco which is here alluded to. There was also a map published in Europe, in 1545, three years after Cabrillo's voyage, in which *a* San Francisco bay is named, as well as the Farallones, which some authors consider a proof that it was "the Bay." As it was Cabrillo who named those islands, after Farallo his pilot, and it is known that he did not enter "the Bay," it is clear that there must have been another San Francisco harbor, which is not that known by that name at present.

It may be stated, as a proof that there was another port of San Francisco, besides the present bay, that, in 1812, Baranof, chief agent of the Russian-American Company, asked permission from the Governor of California, to erect a few houses and leave a few men at Bodega Bay, a "little north of the port of San Francisco." San Francisco Bay had been visited before that time, by the Russians, and was known to be nearly sixty miles south-east from Bodega, which place is only "a little north" of Punta de los Reyes, where the Spanish port of San Francisco is located, and where Viscayno anchored.

As further proof that there was such a harbor, we refer to the fact that Governor Portala, when his party first discovered the great bay, called it San Francisco, under the impression that it was the harbor of that name, north of Punta de los Reyes, which had long been known to the Spanish navigators on the coast, as is proven by the above extracts.

From 1610 to 1660, upwards of twenty attempts were made to explore and take possession of the country, under a vague, irresistible impression that it contained not alone large deposits of gold, silver, and pearls, but diamonds and other precious stones.

But little, however, is known of the country from the date of Viscayno's discoveries, till 1767, or one hundred and sixty-four years afterwards; when the Jesuit missionaries, being expelled from Lower California by order of Charles III of Spain, their missions and property were granted to the Fathers of the Order of St. Francis. These enthusiastic propagandists, acting under instructions from the Marquis de Croix, then Viceroy of Mexico, made arrangements for extending their labors into the upper territory. To carry this object into effect, Father Junipero Serra, a very energetic and zealous member of the order, was, in 1768, appointed President of all the Missions to be established in Upper California. This holy man, who was the real founder of civilization in the territory now owned by the State, in company with sixteen monks from the convent of San Fernando, in the City of Mexico, proceeded to carry out the objects of the Viceroy, which were to establish missions at Monterey, San Diego, and San Buenaventura. Expeditions were at once arranged to take possession of the country, both by sea and land; the ships to be used to carry all the heavy materials and supplies, and the land party to drive the flocks and herds. The first vessel, the *San Carlos*, in command of Don Vicente Vilal, left Cape St. Lucas (Lower California) on the 9th of January, 1769, bound for San Diego, and was followed by the *San Antonio*, commanded by Don Juan Perez, on the 15th of January. A third vessel, the *San José*, was dispatched from Loretto, on the 16th of June.

The sufferings of the "pioneers" on board these vessels afford a striking contrast to the security, comfort and rapidity enjoyed by the voyagers to and from California in the present day. The *San Carlos* arrived at San Diego on the 1st of May, with the loss of all her crew—except the officers, cook, and one sailor—through scurvy, thirst, and starvation. The *San Antonio* arrived on April 11th, with the loss of eight of her crew by scurvy. The *San José* was never heard of after leaving Loretto.

The land expedition was formed into two divisions. Don Gaspar de Portala, who had been appointed Military Governor of the new territory by Don José de Galvaez, the special agent of the King of Spain, appointed Captain Rivera y Moncado to take charge of the first; the Governor himself taking charge of the second. Rivera and his party, consisting of Father Crespo, twenty-five soldiers, six muleteers, and a party of Indians from Lower California, started from Villacata on the 24th of March, 1768, and arrived at San Diego on the 14th of May. This was the first white settlement in Upper California.

Father Begart, a German Jesuit, who lived for many years in Lower California, on the expulsion of his Order from that territory, returned to Manheim, his native place, where, in 1773, he published an "Historical Sketch of the American Peninsula of California," in which he states that no white man had ever lived in Upper California until the year 1769.

The second division, accompanied by Father Junipero, started from Villacata on the 15th of May, and arrived at San Diego July 1st.

The worthy father organized the mission on the 16th of July; and the first native Californian was baptized on the 26th of December.

On the 14th of July, Governor Portala, accompanied by Fathers Juan Crespi and Francisco Gomez, and fifty-six white persons, including Captain Rivera, a sergeant, and thirty-three soldiers, Don Miguel Constanzo, engineer, a party of emigrants from Sonora, and a number of Indians from Lower California, started out to find Monterey, for the purpose of founding the mission there. By some means or other, they did not find the bay of Monterey; but, continuing their wanderings to the north, they, on the 25th of October, 1769, discovered the gem of the Pacific—the bay of San Francisco, one of the finest harbors in the world, so securely land-locked and sheltered that none of the keen explorers who had been within a few miles of it, had succeeded in discovering its entrance. Having given the bay the name of San Francisco—the titular saint of the missionaries—the party returned to San Diego, which they reached on the 24th of January, 1770, after an absence of six months and ten days.

Some writers credit Father Junipero Serra with the discovery of this beautiful bay; but there are no good reasons for believing that he ever saw it for nearly six years after its discovery. His name is not included in the list of those who accompanied Governor Portala, whose party made the discovery. On the contrary, it is distinctly stated by Father Palou, the chronicler of the missions, that "Father Junipero, with two other missionaries and eight soldiers, remained behind at San Diego."

It was discovered soon after their return, that the provisions on hand were only sufficient for a few weeks, with little prospect of relief, unless a vessel, then several months overdue, should make her appearance. It was decided that, if she did not arrive before the 20th of March, the party would return to the missions in the lower territory, and abandon the upper one. The arrangements were completed for this purpose when, on the 20th, the *San Antonio* made her appearance, or California would have been abandoned, and the most important events in her history would never have been written.

Scarcely any importance appears to have been attached to the discovery of the grand bay in which the ships of all nations have since found wealth and safety. It was upwards of six years before any attempt was made to found a mission on its shores.

## THE CHANGES IN ITS BOUNDARIES.

As explained in a preceding portion of this chapter, the name California, was originally applied either by Grixalva to the peninsula of Lower California, under the supposition that it was an island, or by Bernal Diaz, to a bay in the same vicinity. Through causes which do not come within the province of our purpose to explain, in the course of the century succeeding its adoption, this mysterious name of California, which has since attracted the attention of the whole civilized world, had spread to such an extent that it embraced the entire continent to the north, as far as the arctic circle, as well as a considerable portion of the territory on the south of both the points to which it is claimed to have been originally applied.

In 1536, we find it applied by the Spaniards to the southern portion of the great peninsula which extends on the western side of North America, and to the whole Pacific Coast, from the 32d degree of north latitude to the limit of the frigid zone. Subsequently, they caused it to include that portion of the continent northwest of Mexico, and extending east to Canada ; claiming the whole country by right of a Pope's bull.

Nor were the Spaniards the only nation that aided in extending the dominion of the name of California. Jean Bleau, a famous Dutch geographer, published an extensive work on the geography of the Pacific coast, in 1662, at Amsterdam, in which he includes, under the name of California, the whole coast from the northern boundary of South America to Behring's straits, (then called the straits of Anian,) This application of the name was followed by many French, Spanish, English, German, and Russian writers on geography, during the seventeenth and eighteenth centuries. Until as recently as 1750, Kodiack, a portion of the late Russian territory of Alaska, was included in California, in many works published relating to the Pacific and northwest coast.

Yet, notwithstanding that it denominated so extensive a section of the North American continent, it was not until towards the close of the eighteenth century, that the name of California began to be generally known in Europe or the United States—being considered of so little importance as to be rarely mentioned, except by writers on geography.

In a map of the world, published in the year 1554, at Venice, a copy of which is in the Odd Fellows' Library at San Francisco, the continent of North America unites with Asia, the river Colorado is shown as having its source in the mountains of Thibet, and empties into the Gulf of California, after meandering through the continent for more than fifteen thousand miles.

On English maps, published as recently as 1750, California is represented as an island, extending from Cape St. Lucas to the forty-fifth degree of latitude. It was not until Father Begart's book on California was published at Manheim, in 1771, that California was known to be a portion of the American continent by geographers, and many years after it was still referred to as a peninsula.

Towards the close of the seventeenth century, the Spaniards had lost a considerable portion of their loosely held territory, by the encroachments of the British, Russians, and Americans, on its northern and northeastern borders, as well as by absolute abandonment, so that for nearly a hundred years, the boundaries of California proper, included only the peninsula known as Lower California, and the strip of country embraced within a line arbitrarily drawn from the head of the Gulf of Mexico to the shore of the Pacific Ocean, considerably to the south of the present harbor of San Diego.

After the settlement of the territory north of the peninsula, by the missionaries, in 1769, it being considered a portion of the same country, inhabited by the same race of people, it was again called California, but distinguished from the older territory by being called New, or Upper California. It had been recognized for several years previously as New Albion, a name given to it by Sir Francis Drake, who, while on an exploring expedition on the coast, in 1759, took possession of the country in the name of Queen Elizabeth of England. Many of the English writers described it as "Drake's Land, back of Canada." It is a portion of this Upper California, or New Albion, this land "behind Canada," which now forms the flourishing State of California.

The boundaries of the new territory thus re-acquired by Spain, through the services of the missionaries, was never very accurately defined until its purchase by the United States from Mexico, which had acquired it by the "right of revolution." The missionaries, from 1796 till about 1820, were literally "monarchs of all they surveyed"—no one questioning their pretensions. When La Pérouse visited the country, in 1786, the authority of the military governor of the two Californias extended over about eight hundred leagues. Although under the control of a military officer, the territories were purely religious colonies. There were no settlements outside of the twenty-one missions which then existed at different points along the coast, none of which were located more than a few miles from the sea.

In 1835, according to Forbes, the British Consul on the coast at that time, the boundaries of Upper California, under the control of the missionaries and early settlers, were about five hundred miles in length by an average breadth of about forty miles, forming an area of about twenty thousand square miles, or thirteen millions of English statute acres. No settlements had been attempted in the foot-hills at that date.

When the United States commenced negotiations for the acquisition of the territory, California was considered as including the peninsula and the territory extending from it on the Pacific coast, northward, as far as the southern limit of Oregon; Cape Mendocino, in latitude 40° 27′ being assumed by the United States as the extreme northern limit of the Mexican territory—though the government of that country claimed to a higher parallel of latitude, in accordance with a treaty made between the two governments in May, 1828. But the northern limit of the actual Mexican settlements in California, at that time, were San Francisco, in 37° 47′ north latitude, and longitude 122° 22′ west, and Cape St. Lucas, on the south, in 22°48′ north latitude, and 109°47′ longitude.

By the treaty between the United States and Mexico, of May, 1848, the territory obtained by the United States, extending eastward from the Pacific Coast was so extensive, and so little known, that the members of the Convention which assembled at Monterey in 1849 to frame a Constitution for the then embryo State of California, found it exceedingly difficult to decide how far they should extend the border of the new State into this *terra incognita.* The committee appointed for that purpose proposed to make the boundaries, the ocean on the west, Oregon on the north, Mexico on the south, and the 116th parallel of longitude on the east, which would have included about one half of the present State of Nevada, the territory of which, at that time, was supposed to be a barren, worthless wilderness. It was proposed by one member of the Convention to amend the report by adopting the line of separation between California and New Mexico, as marked on Fremont's map, which would have included a great portion of Utah, as well as the whole of Nevada. Another member proposed to amend the report by extending the eastern boundary to the 105th parallel of longitude, which would have included Nevada, Utah, and portions of Nebraska, as well as nearly the whole of Colorado. The matter, after considerable debate, was finally decided by adopting the following boundaries, which are those at present existing: "Commencing at the point of intersection of the 42nd degree of north latitude with the 120th degree of longitude west of Greenwich, and running south on the line of said 120th degree of west longitude until it intersects the 39th degree of north latitude; thence running in a straight line in a southeasterly direction, to the River Colorado, at a point where it intersects the 35th degree of north latitude; thence down the middle of the channel of said river to the boundary line between the United States and Mexico, as established by the treaty of May 30th, 1848; thence running west, and along said boundary line to the Pacific Ocean, and extending therein three English miles; thence running in a northwesterly direction, and following the direction of the Pacific Coast to the 42nd degree of north latitude; thence on the line of said 42nd degree of north latitude to the place of beginning; also, all the islands, harbors, and bays along and adjacent to the Pacific Coast."

These boundaries embrace a territory of about seven hundred miles in length by about two hundred miles in average breadth—covering nearly one hundred and fifty-nine thousand square miles; the longest line, seven hundred and ninety-seven miles, being from Crescent City, Del Norte County, to Fort Yuma, in San Diego County; forming a State larger than any other in the North American Republic, except Texas—three times as large as the United Kingdom of Great Britain and Ireland, and nearly as large as the whole French Empire.

### THE MISSIONS—THEIR BEGINNING AND END.

We have already shown that the first successful efforts towards civilization in Upper California were made by monks of the Order of St. Francis. Without going into details of the history of these real pioneers of the State, or of the missions they founded, these missions form such an important link in the chain of events that mark the progress of California, that the merest sketch of its history would be incomplete, were they omitted. Besides, these generous old Padres deserve a passing notice, as a mark of recognition of their well-intended but ill-directed labors in the service of God and man. What profoundly interesting material for the moralist, the virtues and weaknesses of these kind old men furnish. How true to them has been the proverb that "the love of money is the root of all evil." While few Christians, or philanthropists, can approve of that religion, or system of government, which aims at no higher purpose than to cultivate the fears of the untutored child of nature in order to make him labor for the advantage of his teacher—none can ponder over the sweeping destruction of the wretched natives which followed the abolishment of the missions without feeling pity for the miserable remnant of the race remaining, who are neither savage nor civilized, having the vices of both conditions, but the virtues of neither.

For several years after the establishment of the first three missions, briefly referred to heretofore, the missionaries were liberally sustained with means for their support and for the extension of operations, both by grants from the Spanish government, which was most anxious for the settlement of the country, and its annexation to that empire, and by contributions and endowments from zealous Catholics of Spain and Mexico, who were anxious that all the natives should be converted to Christianity. These grants and collections had been previously formed into what was called the "Pious Fund of California," during the days of the Jesuits, but on the expulsion of that order were placed under the control of the Convent of San Fernando, of the Order of St. Francis, in the City of Mexico, from whence all the missionaries were sent. By the aid of this fund, the increase of their herds and flocks, and the labors of the natives, in the course of a few years the missionaries became wealthy, and, but for the radical error of the whole system, which required separation from the world to insure success, they might have been in existence to-day—one of the wealthiest religious communities on earth—with their proselytes as happy and contented as they are now wretched and miserable.

For sixty years after their settlement the missionaries had an almost undisturbed field in which to test the efficiency of their schemes for civilizing the natives. They extended their dominions from San Diego to San Francisco, established missions at intervals of twenty or thirty miles between these places; took possession of the whole country, by causing the lands of one mission to join with another, so that free settlers, who even in those early days desired to dwell in the land, were as effectually excluded as if the whole coast had been surrounded by a wall—for the Holy Fathers were the temporal as well as the spiritual lords of the land, and there was no appeal from their decisions. They cultivated the vine, the olive, and the fig, and enjoyed all the comforts and luxuries a genial climate, a generous soil, and abundance of costless labor could produce; for the whole race of natives were their servants, working for food and raiment of their own production. In 1831 there were 18,683 Indians domesticated at the missions, while their horses, cattle and sheep multiplied amazingly on the virgin pastures that covered the valleys of the Coast Range. But, as the Fathers waxed rich, they seemed to have relaxed their efforts for the conversion of the heathen, and paid more attention to the cultivation of their broad acres than to civilizing their neophytes.

After founding twenty-one missions along the coast, (the last of which, in 1823) they appear to have abandoned all the natives of the interior to their fate, as there is no proof that any effort was ever made by the missionaries to explore the interior of the territory, to ascertain whether the country or its inhabitants were worth cultivating. From 1800 to 1822 the Fathers appear to have experienced the most halycon days of the system, living in patriarchal state, with almost regal revenues and powers. Beyond the mere routine of religious formality, their priestly office had degenerated into managers of farms, flocks and herds, and traders in produce.

About the year 1800, vessels from Boston, New York, and England, while sailing in search of adventures, along the shores of the "South Seas," or on the "North West Coast," as this then unknown portion of the world was called, occasionally found their way through the Golden Gate, to trade with the missionaries for hides, tallow, and wine, and other produce of the missions, the white and red wines of which soon obtained high repute. The Mission of San Gabriel annually made from four hundred to six hundred barrels of wine, and several of the other missions nearly as much.

The overthrow of the Spanish dominion in Mexico, in 1822, was the death blow of the mission system, although it had begun to decay several years previously. No new missions were founded after 1823. The precautions the Fathers had taken to prevent free emigrants settling in the territory redounded to their injury, because it deprived them of all means of self defence, under the new order of things the change of government introduced, as, at the time of framing the Constitution for the Mexican Republic, population was, very properly, considered as the basis of representation, when, having only a few white inhabitants—the Indians not being taken into consideration—Upper California was denied representation as a State, and was declared a Territory, entitled to a representative in the Congress, who had no vote. The first delegate was a sergeant of one of the military companies, who held that office for two years, because no other eligible resident was to be found.

Very soon after the independence of Mexico, the great riches possessed by the California missions had become a subject of much solicitude to the Mexican Congress, and in 1826 a law was passed to deprive the Fathers of their lands, and of the labor of the Indians—stopping their salaries, and appropriating the "Pious Fund" to the service of the Republic.

The accumulation of wealth by the Fathers had grown to be enormous. According to Rev. Walter Colton, Chaplain of the U. S. ship *Congress,* the first Protestant clergyman that resided in California, in 1825, the Mission of San Francisco owned 76,000 head of cattle, 950 tame horses, 2,000 breeding mares, 84 stud of choice breed, 820 mules, 79,000 sheep, 2,000 hogs, and 456 yoke of working oxen.

The Santa Clara Mission had 74,280 cattle, 407 yoke of working oxen, 82,540 sheep, 1,890 horses broken to saddle, 4,235 breeding mares, 725 mules, and 1,000 hogs. This mission, in the year 1823, branded 22,400 calves, as the increase of that year.

The Mission of San José had 62,000 cattle, 840 broken horses, 1,500 mares, 420 mules, 310 yoke of working oxen, and 62,000 sheep.

The Mission of San Juan Bautista, as early as 1820, owned 43,870 cattle, 1,360 tame horses, 4,870 mares and colts, and 69,500 sheep.

The San Carlos Mission, in 1825, had 87,600 cattle, 1,800 horses and mares, 365 yoke of working oxen, and 7,500 sheep.

The Soledad Mission in 1826 owned 36,000 head of cattle ; a larger number of horses and mares than any other mission ; 70,000 sheep, and 300 yoke of oxen.

The Mission of San Antonio, in 1822, had 52,800 head of cattle, 1,800 tame horses, 3,000 mares, 500 yoke of oxen, 600 mules, 48,000 sheep, and 1,000 hogs.

The San Miguel Mission, in 1821, had 91,000 cattle, 1,100 tame horses, 3,000 mares, 2,000 mules, 170 yoke of oxen, and 47,000 sheep.

The Mission of San Luis Obispo had 87,000 cattle, 2,000 tame horses, 3,500 mares, 3,700 mules, and 72,000 sheep. One of the Fathers of this mission took $100,000 with him when he left for Spain, in 1828.

All the other missions were equally rich in live stock ; while the specie in the coffers of the Fathers, and value of the gold and silver ornaments of the churches, exceeded half a million of dollars.

Here again the errors of the mission system became apparent. The wretched natives, educated to obey the Fathers in all things, without being taught to depend upon themselves in any way, when deprived of their directors, became more dangerous to the few settlers then in the territory than the wild Indians of the interior. On the representations of these settlers, who became every year more numerous and influential, the Congress was induced, a year or two afterwards, to repeal that portion of the law relating to the natives, and they were permitted to return to the missions. But they were never again as contented, or as much under control as before. The products of the labor of such of them as returned to work on the mission ranches, together with the hides and tallow obtained from their flocks and herds, enabled the Fathers to maintain themselves in tolerable affluence till the year 1833, when the Congress enacted a law to abolish the missions entirely, to remove the missionaries, and to divide their lands and cattle among the natives and settlers. Santa Anna coming into power through the aid of the church party, before the law could be carried into effect, it was repealed.

It was a very narrow escape for the Fathers, however. Commissioners had been appointed by the government to engage emigrants in Mexico, who were to be paid half a dollar per day till their arrival in California, with a free passage, and provisions on the way.

Nearly three hundred men, women, and children arrived at San Francisco in 1834, to form a colony on the strength of this confiscation law; but Santa Anna had sent messengers overland with instructions to Figueroa, the Governor of the Territory, who, when the emigrants arrived, informed them of the changed condition of affairs, and the missions escaped spoliation for that time. But their end was near, for amid all the turmoils and political convulsions that distracted Mexico during the ensuing ten years, every party that managed to get hold of the reins of government continued to fleece the Fathers out of something, till, little by little, they were deprived of all their privileges.

The missions became neglected, the Indians could no longer be induced to plant crops, and there was nobody else who would, so the fields were overgrown with weeds, and the Fathers became careless, killing thousands of their cattle to obtain the price of their hides and tallow. Matters grew from bad to worse until 1840, when the Congress took charge of the missions, and most of them were permitted to go to ruin. In 1845, several of those remaining were sold at auction to whoever would buy them, and the miserable Indians, whose labors had built them up, were abandoned to their fate. Thus ended the mission system of California, a system which had clearly "outlived its usefulness," but had prepared the way for a better civilization, in which the unfortunate natives of the soil were not destined to participate.

The last of the old missionaries, Father Altemira, the Padre of San Rafael and Sonoma at the time of the abolishment of the missions, was living at Teneriffe, one of the Canary Islands, in 1860.

The following is a list of the missions, the date of their formation. and where located :

| | Names. | When Founded. | Where Located. |
|---|---|---|---|
| 1st | San Diego | July 16, 1769 | Latitude 32°48′ |
| 2nd. | San Carlos de Monterey | June 3, 1770 | Latitude 36°44′ |
| 3rd. | San Antonio de Padua | July 14, 1771 | Latitude 36°30′ |
| 4th. | San Gabriel | Sept. 8, 1771 | Latitude 34°10′ |
| 5th. | San Luis Obispo | Sept. 1, 1772 | Latitude 35°36′ |
| 6th. | San Francisco de los Dolores | Oct. 9, 1776 | Latitude 37°57′ |

| Names. | When Founded. | Where Located. |
|---|---|---|
| 7th. . San Juan Capistrano | Nov. 1, 1776 | Latitude 33°26′ |
| 8th. . Santa Clara | Jan. 18, 1777 | Latitude 37°20′ |
| 9th. . San Buenaventura | March 21, 1782 | Latitude 33°36′ |
| 10th. . Santa Barbara | Dec. 4, 1786 | Latitude 34°40′ |
| 11th. . La Purisima Concepcion | Dec. 8, 1787 | Latitude 35° — |
| 12th. . Santa Cruz | Aug. 28, 1791 | Latitude 37° — |
| 13th. . Nuestra Señora La Solidad | Oct. 9, 1791 | Latitude 36°38′ |
| 14th. . San José | June 11, 1797 | Latitude 37°30′ |
| 15th. . San Juan Bautista | June 24, 1797 | Latitude 36°58′ |
| 16th. . San Miguel | July 25, 1797 | Latitude 35°48′ |
| 17th. . San Fernando Rey | Sept. 8, 1797 | Latitude 34°16′ |
| 18th. . San Luis Rey | June 13, 1798 | Latitude 33°3′ |
| 19th. . Santa Inez Virgin y Martyr | Sept. 17, 1804 | Latitude 34°52′ |
| 20th. . San Rafael | Dec. 14, 1817 | Latitude 38° — |
| 21st. . San Francisco de Solano de Sonoma | April 25, 1820 | Latitude 38°30′ |

These missions were all built on one general plan, but some were constructed of better materials, and more artistically finished than others, according to the locality and skill of the missionaries in charge, who generally acted as architects, masons, and superintendents. They usually formed three sides of a square in outline. In the middle was the church, on which the greatest amount of labor was always expended, in order to make it as large and as handsome as possible. Its interior was as highly decorated as the means of the presiding Father would admit. Its walls were always adorned with gorgeously colored pictures of subjects calculated to attract the attention of the simple minded natives, while about the altar were placed massive gilt candlesticks, images, gold and silver vessels, and everything that had a tendency to attract special attention to them. The old Mission Church, at Santa Clara, which still exists, in excellent repair, is an interesting specimen of the skill of the missionaries, and of the labor of the natives. At this mission the houses of the natives formed five rows of streets, and were more comfortable than at any other.

The old Mission of San Juan, which stands fronting the town of San Juan South, is another good illustration of these relics of the past. Its adobe walls, with their long corridors of massive arches, is strongly in contrast with the modern brick convent adjoining, in which one hundred young ladies are taught the same religion the founders of the missions sought to propagate among the natives.

The Santa Barbara Mission, which also continues in tolerably good repair, is one of the most pretentious of these ancient structures. At each corner of the front of this building there is a tower thirty-five feet high, surmounted by double belfries, above each of which is the symbolical cross. In front of this massive façade there still remains the ruins of a large fountain, and the signs of the walks and *parterres* the Fathers delighted to cultivate.

The houses occupied by the priests were always close to the church, and behind them were arranged the workshops and storehouses. Most of the main buildings were constructed of adobe, or unburnt clay, moulded into masses as large as a man could conveniently lift, and were roofed with tiles partially burned, to better stand the weather. The quarters occupied by the natives were generally at some distance from the church, and consisted sometimes of rough adobe walls, covered with leaves, and at others of mere huts, such as the Indians usually constructed for themselves in the wilderness.

Near the Indian quarters, which were called the *rancheria*, was the *castillo*, in which resided the garrison, generally three or four Mexican cavalry soldiers—an accompaniment of every mission. This citadel was made as strong as possible, to withstand attacks from the Indians, in case of outbreaks among them, which were of frequent occurrence during the early days of the settlement. The soldiers who resided at the missions were a worthless set of ruffians, most of them having been transported to California as a punishment for crimes committed in Mexico.

In addition to the military stationed at the missions there were distinct military establishments called Presidios, maintained by the Spanish government to aid in preserving peace among the natives, as well as to repel any attempt at invasion by foreign powers. There were four of these Presidios—located at San Diego, Monterey, San Francisco, and Santa Barbara, the chief harbors in the territory. Each was fortified with high walls made of adobe, on which were mounted a few guns of small calibre. The garrisons were rarely inside these fortifications. Being under but little restraint, they roamed over the country, or settled upon some pleasant spot, took one of the converted Indian women for a wife, and obtained a grant of land as a dower. The first grant of land in the territory, by the Spanish government, was made on the 27th of November, 1775, to Manuel Butron, a Spanish soldier, who married Marguerita, one of the converts of the Mission of San Carlos.

Many of the old Spanish soldiers and their descendants are living in California, at this time, on ranchos granted to them for services at these Presidios. One of these relics of the past was living at Santa Barbara in 1865, and was quite a curiosity in his way. He wore knee breeches and buckles, and silver buttons on his jacket, as in the days of old, and was fond of telling about the events that occurred while

California was under the dominion of Spain. He was in Monterey in the year 1800, and had such a vivid impression of the great earthquake of 1812 as to give quite an interesting account of the forty days shaking which then occurred. He was with Captain Morago on the first expedition sent to explore the country, when that Captain discovered the San Joaquin River, and reached the Sierra Nevada, giving the present name to Calaveras county, in consequence of finding the bones of so many dead Indians scattered about. What changes have taken place in the country during the life of this old resident!

It appears to have been the design of the Spanish government to settle the country by such men, as it authorized the laying out of "pueblos," or towns, near each of the presidios and missions, in which every settler was to have had a two hundred vara lot of ground, as a homestead, with the privilege of certain common and timber lands, laid out for the use of the villages. This relic of Spanish rule in California has been the source of much litigation since the country has come into the possession of the Americans, as the titles to lands made by the Spanish or Mexican authorities are recognized in the courts of the United States.

The site on which the City of San Francisco has been built was a portion of the pueblo of the mission located there. A number of parties claimed this land, on the pretext that there was no pueblo at this place, but the Supreme Court of the United States having decided that there was, a new cause of litigation arose, to decide who were the lawful custodians of the four leagues of these pueblo lands—by whom, and to whom, they should be distributed. These points continue to attract much attention, and are of vital importance to the present and future prosperity of the State.

There were also three independent towns, or pueblos, altogether separate from the missions and presidios, formed by the old Spanish or Creole soldiers discharged from the service, who married among the natives and settled at these places, which were: Los Angeles, San José, and Branciforte—now Santa Cruz.

## THE ABORIGINES OF CALIFORNIA.

There is scarcely any subject connected with the early history of the State, more instructive or suggestive, as exhibiting its natural wealth, than the condition of its original inhabitants, when they were first discovered.

Owing to the studied efforts of the missionaries, to misrepresent the mental and physical condition of the native Californians, in order to palliate their own conduct in holding them in bondage for so many years, it is not safe to trust the writings of the Fathers on this subject. According to their reports, the unfortunate race stood at the very foot in the scale of humanity—were inferior in intelligence to the Bosjesmen of Africa, and worse in their habits than the disgusting aborigines of Australia. Such a character not only does injustice to the aborigines of California, but to the country that gave them birth; although it is generally accepted by those who form an estimate of the condition and disposition of the race, by the wretched remnant of it now remaining. It is necessary to go back to the period ere he became sophisticated by civilization, to form a just estimate of the aboriginal Californian, or of the country he inhabited. Fortunately, there are numerous disinterested sources through which the most reliable information on the subject may be obtained, from the date of their first discovery.

It is unjust to charge him, as do some, with being indolent, because his native land furnished him with abundance of food, without much exertion on his part; or to say he was cowardly, because he was not continually at war with his neighbors, in an incessant struggle for existence—the normal condition of most savage races; or to consider him more savage than other savages, because he built only frail houses and made but few clothes, which the mildness of the climate, and the fashions of his race, enabled him to dispense with. Some writers even go so far as to insist that the Californian Indians were lower, as types of humanity, than the Fejee or Sandwich Islanders, because the latter made clothes, cultivated the soil, and were skilled in the use of weapons of warfare. Such writers should remember that the islanders were compelled to make garments, to protect themselves against the heat and cold of their country; were obliged to cultivate the soil, or starve, as it produced but little spontaneously, and had to become dexterous in the use of weapons of warfare, in order to avoid being eaten by their conquerors. No such exigency or necessity attended the life of the aboriginal Californian. Is it fair, then, to charge him with indolence, because his beneficent Creator had abundantly provided for all his wants, and left him but little to do except to enjoy life? No country in the world was as well supplied by Nature, with food for man, as California, when first discovered by the Spaniards. Every one of its early visitors have left records to this effect—they all found its hills, valleys and plains filled with elk, deer, hares, rabbits, quail, and other animals fit for food; its rivers and lakes swarming with salmon, trout, and other fish, their beds and banks covered with mussels, clams, and other edible mollusca; the rocks on its sea shores crowded with seal and otter; and its forests full of trees and plants, bearing acorns, nuts, seeds and berries, while its climate was so mild and genial, that clothing was not a necessity. It would have been strange indeed, if an uncivilized race, whose lot was cast in such a pleasant place, had not been found enjoying life, as they understood it. It may have been their misfortune to have been born in so desirable a country—one so well adapted for the dwelling-place of their superiors; but it is not just to charge such a circumstance against them as a fault, or to accuse them of indolence when there was no necessity for them to labor. Equally unjust is it, to charge them with being stupid, and incapable of instruction, in the face of the fact that it was their labors that enriched the missions, and proved to the world the latent value of the soil of California. Nor is it true that, as a race, they were cowardly. The record shows how bravely many of the chiefs and tribes contested the encroachments of the first settlers on their lands. Marin county owes its name to the chief of the Lecatuit Indians who inhabited that section of the State until 1824, and for many years defied all the forces sent to dispossess him. Sonoma, the name of another county, containing one of the most beautiful valleys on the coast, derives its name from a famous chief of the Chocuyens. Solano, the name of another county, was once that of a warlike chief of the Suisuns. Napa county derives its name from the tribe that once owned the land between San Pablo bay and Mount St. Helens, which now forms its beautiful farms, orchards, and gardens, which they fought long and fiercely to retain as their hunting grounds. So with Colusa, Shasta, Yolo, and several other counties—their names are the mausoleums of extinct tribes of aborigines, who bravely struggled against an inexorable destiny, which has in so few years swept them away.

The annals of the State, during the past eighteen years, either prove how fiercely the natives fought for the land of their birth, or that many thousands of dollars were expended in exterminating a race of men who did not deserve thus to die.

They are accused of having been destitute of any conception of religion, affection, trade, art, or any of the higher attributes of humanity. This is unjust to them, as well as to California. If it be true, as it is asserted by philosophers, that Nature dominates over man, and constrains his actions through the agency of the scenery and physical conditions that surround him—a theory strangely confirmed by the distinguishing traits of all civilized nations—then California, with its cloudless skies, salubrious air, gorgeous scenery, and abundance of all the elements that minister to human happiness, could not have produced a race destitute of faculties to enjoy the blessings provided for them by their Creator. Nor did it produce such a race; there is abundance of proof to the contrary.

Cabrillo, the discoverer of the country, who spent six months among the natives who dwelt in what is now Santa Barbara county, has left on record the names of forty towns, or villages (pueblos) which existed in that section of the State, at the time of his visit.

Viscayno, who visited the same section of the coast in 1602, or sixty years after Cabrillo, confirms all that his predecessor had stated about the condition of the aborigines, and says: they lived by hunting, fishing, and gathering seeds, nuts, and wild fruit. This authority states, further, that on the Island of Santa Catalina, off the coast of Santa Barbara, the natives had large wooden canoes, capable of holding twenty persons each, with which they caught large quantities of fish, which they sold to the natives on the main land.

It has been known to the Jesuit Fathers, and Spanish Government in Mexico, since 1540, that the natives of Upper California traded with the tribes dwelling far in the interior of the continent, for abalone, cowry and other shells, and various other articles. Father Palou says: "the natives of the main land made rafts, or canoes of the tule, for fishing, in which they went a great way out to sea." These extracts are sufficient to show that the natives were not destitute of skill, enterprise, or intelligence.

With reference to their notions of morality, Father Junipero Serra, the founder of the missions in Upper California, writing to his brethren on the peninsula, under date of July 3d, 1769, two days after his arrival in what is now the State of California, says:

"The number of savages is immense. All those of this coast, from the shore of Todos Santos, live very contentedly upon various seeds and fish, which they catch from their canoes made of tule, with which they go out a considerable distance to sea. They are very affable. All the males, both large and small, go naked; but the females are modestly clad, even to the little girls at the breast."

Father Palou records the same peculiarity of clothing the females, as do all the early visitors to the coast. Captain Woodes Rogers, who was here in 1711, says none of the young females were permitted to be seen by him or his crew.

They were remarkable for the affection that existed between parents and children, and for the firmness of the friendships that were formed among them.

They were not quarrelsome, rarely fighting, and amused themselves with games of skill or chance, and dancing, which, if considered stupid by those accustomed to scenes in other lands, was quite exciting to them. In their marital relations they did not differ materially from the Mormons of the present day—the daughters and their mother often being the wives of the same man. Father Palou says: "The first baptisms made at the mission of San Francisco, were of three children, all born within two months, sons of an Indian and three sisters, to whom he was married, as well as to their mother.

They must have had some idea of a future state, or they would not have burned or buried their ornaments and weapons with the dead, as was the universal custom. They expressed their ideas of a change from life to immortality, by saying that "as the moon died, and came to life again, so man came to life after death;" and believed that the "hearts of good chiefs went up to heaven and were converted into stars, to watch over their tribe on earth."

There were priests, or sorcerers, both male and female, among them, who pretended to exercise supernatural control over their bodies, claiming to cure disease by incantations and curious rites and ceremonies. These priests wore long robes made of human hair, and were formidable rivals to the missionaries. Scores of these human-hair robes were burned by the Fathers, before their rivals were driven out of the field.

Viscayno says, the natives of Catalina Island had a temple, containing an idol "which they worshipped with sacrifices." These excerpts are sufficient to prove that they were not destitute of all "conceptions of religion."

Captain Rogers says, of their honesty, that they never took anything belonging to him, though his carpenters and coopers generally left their tools on shore. Other voyagers speak in similar praise of their honesty.

Forbes says, "their children, taught by the missionaries, spoke Spanish, and became polished by conversation."

With reference to their taste and skill in making ornaments, weapons, and utensils, La Pérouse, who was here in 1786, says: "they wore ear-rings made of carved wood, bandeaux of feathers round their heads, and shells strung as beads around their necks and bodies. He describes some of these feather bandeaux as exceedingly beautiful, and as the product of great labor and skill. Langsdorff also notices the same articles, and says he counted in one of these bandeaux four hundred and fifty feathers from the tails of golden woodpeckers. As each of these birds has but two such feathers—and it is probable that every bird killed did not have both in perfect condition—it must have required much application to obain materials for such an ornament.

Forbes credits them with extraordinary skill in the construction of their baskets, bows and arrows; some of the former, made of the filamentous bark of a tree, were plaited so closely as to be perfectly watertight, and although made of very combustible materials, were used for roasting their grain before it was ground. Many of their baskets were ornamented with the scarlet feathers of the *Oriolus phœniceus*, or with the black crest feathers of the mountain quail, and were really very handsome.

Father Palou says the men had wooden swords, that cut almost like steel, and formidable clubs, as well as bows and arrows, as weapons of warfare.

With reference to their *physique*, there appears to be considerable discrepancy between the statements of different authorities. Venegas thought them "equal to any race"; Captain Rogers says, "they were tall, robust, and straight as pine trees;" Captain Beechey says, "they were generally above the standard of Englishmen, in hight." In after years, some of the half-breeds were quite remarkable for their hight—reaching nearly seven feet.

Langsdorff, surgeon of the Russian admiral Kotzebue's ship, which arrived at San Francisco in September, 1824, states that "many of them had full, flowing beards." La Pérouse also says, "about half the males he saw had such splendid beards that they would have made a figure in Turkey, or in the vicinity of Moscow." It is a very remarkable fact that none of the present race of Indians have any beards.

The foregoing brief outline of the condition and habits of the aborigines of California, before and since their contact with the white race, would appear to justify the belief that they were capable of reaching a higher plane of civilization, than that on which they were placed by the missionaries.

Eminent men of science, from England, France, Russia, and the United States, who visited the coast, and saw the unfortunate natives under the mission *regime*, in its palmiest days, all bear witness to the wretched state of bodily and mental bondage in which they were held. Captain Beechey considered the method adopted by the Fathers, to obtain "converts," as but "little better than kidnapping." Both men and women were flogged, or put into the stocks, if they refused to believe or to labor: other witnesses corroborate this statement.

All the Indian men, except those employed as *vacqueros*, or herdsmen, wore no other clothing than a coarse woolen shirt and a breech cloth. The vacqueros had pants and shoes, more for the sake of enabling them better to ride the unbroken mustangs than for decency. The women had a woolen chemise and petticoat, but neither shoes nor stockings. Both men and women were required to work in the fields every day, except those who were carpenters, blacksmiths, or weavers. None of them were taught to read or write, except a few who were selected to form a choir, to sing and play music, for each mission. The only instruments were the violin and guitar. They never received any payment for their labor, except food, clothing, and instructions in the catechism. The single men and women were locked up in separate buildings, every night. Both sexes were severely punished with the whip, if they did not obey the missionaries or other white men in authority. The Fathers themselves wore but one garment, which reached from their neck to their heels; this was never washed, but was worn continually until worn out.

There is no room to doubt that the degradation of the existing race, is in some degree, the result of the mission system, which has deprived them of the instincts that Nature had implanted, and left them no dependence but upon the will of the Fathers, which was impotent to save them from extermination by the irresistible force of a higher civilization, in which they are unfitted to participate.

The Spanish Government appears to have acted with much liberality towards the aborigines, and intended that they should have had every opportunity to become civilized. It granted them tracts of land for cultivation, and lots in the pueblos for homesteads. Much of the land on which the city of San Francisco now stands, was granted to partially civilized Indians, prior to the year 1820; but a higher power than earthly Governments had destined that site to be occupied by a different race.

The most implacable Indian-hater must contemplate with astonishment, not unmixed with awe, the destruction that has overtaken the native Californians within the past forty years. When their country was first discovered, it was thickly populated with tribes, speaking a variety of dialects, the very names of which have been forgotten.

Mr. Gilroy, the first foreign settler in the State, who landed at Monterey in 1814, gives us the following vivid picture of this so-called mission civilization.

Kit Carson says, when he came to California, in 1829, the valleys were full of Indian tribes. They were thick everywhere. He saw a great deal of some large and flourishing tribes that then existed. When he went there again, in 1859, they had all disappeared, and in answer to inquiries about them, the people residing in the localities where he had seen them, told him they had never heard of them. Yount, who settled in Napa Valley in 1830, says it then contained thousands of Indians ; it has but few now.

No estimate appears to have been made of their number until 1823, when they numbered 100,826, although it was known they had already decreased extensively. In 1863 they were counted by the Indian Department and found to number only 29,300 men, women and children. It is doubtful if there are 20,000 remaining, at the close of 1867. At this rate of decrease, in how few years we shall see the last of the California aborigines ! Their rapid disappearance is not to be attributed wholly to their contact with the white race. That mysterious law of Nature, which has caused the destruction of so many races of created beings at various epochs in the world's history, as we find recorded in the stony leaves of the but partially opened book of the rocks, has willed the end of the Indian tribes of America, as well as of the aborigines of other countries, and no human power can avert it. The census of the Cherokees, the most intelligent and best educated of all the American aborigines, taken in May last, exhibits a decrease of 20,000 during the preceding five years. In Tasmania, New South Wales, there were but four of the aborigines of the country remaining in 1866. Among the Sandwich Islanders, where education, religion and amalgamation are more general than among the aborigines of any other country, the same law is in progress of execution. The race is rapidly passing away. The census of 1866 exhibits a decrease of 9,000 during the preceding five years, out of a population of but little more than 60,000.

Our Federal and State Governments have made liberal provision for the support of the remnant of the aboriginal Californians. The first State Legislature passed a law for their protection, and they are probably much better off under the existing state of affairs than when under the rule of the missions. In most of the southern counties they reside on rancherias, or independent villages, where they raise a few cattle, sheep, and hogs, and sufficient grain, vegetables, and fruit to supply their own wants. In San Diego County there are twenty-eight rancherias, containing altogether about 2,000 natives. None of the other southern counties contain as many, but there are a number of rancherias in each. There are also several reservations provided by the United States government for the protection of those who reside in counties in which the settlers object to their locating. The Superintendents of these reservations report the natives residing on them as being cheerful, contented and obedient, performing all the labor required of them in a satisfactory manner. Seven hundred and fifty of them, residing on the Tule River Reservation, in 1866, cultivated and gathered a crop of 10,000 bushels of wheat, 50,000 pounds of barley, and a large quantity of vegetables ; dug a ditch five miles long, of sufficient capacity to convey water to irrigate the entire reservation ; made a wagon road twenty-five miles in length, besides performing other less important labors in the neighborhood.

On the Round Valley Reservation, seven hundred of them raised 6,318 bushels of wheat, 1,127 bushels of barley, 8,000 bushels of corn, 2,150 bushels of oats, 1,500 bushels of potatoes, besides large quantities of vegetables, hay, etc. They also made 30,000 fence rails, with which they inclosed 2,700 acres of land ; erected a barn, 70x60, with sheds on either side, 12x70 ; and two frame granaries, 40x60—cutting all the lumber for the same by hand.

On the Hoopa Valley Reservation, about six hundred of them raised a valuable crop of wheat and barley.

On the Smith River Reservation, about five hundred of them raised sufficient to maintain themselves.

There are other reservations in Los Angeles, Tehama, Klamath, Mendocino, and Fresno counties—each containing about 25,000 acres.

The above results would seem to prove, that under judicious management, these reservations may be made self-sustaining, while the Indians on them would be far more comfortable than when permitted to roam through portions of the State, where they can obtain subsistence by no other means than the charity of the inhabitants.

Having traced the condition and characteristics of the aborigines of California, from their discovery by the Spaniards, till they fell under the protecting care of the United States, it will be pertinent to the subject to make a few remarks concerning their origin, which is really the most remarkable chapter of their history, as well as that of the State.

The investigations of ethnologists and philologists who have studied the Hindoo, Chinese, and Japanese annals during the present century, have brought to light such a chain of evidence as to place beyond doubt that the inhabitants of Mexico and California, discovered by the Spaniards, were of Mongolian origin.

There is no real cause for surprise at such a discovery, when we remember that the Greeks and Romans—the compilers of our records of the world's early history—knew nothing of the countries west of the shores of Africa, or on the east, beyond the 120th degree of longitude west of Greenwich. It was not until the thirteenth century that Marco Polo discovered Japan, and more than a century after that event, before Columbus discovered America—literally a new world to the chroniclers of that history.

It was not until Magellan, on the 21st of October, 1520, made a passage through the straits that now bear his name, that the spherical form of the earth was demonstrated to the savans and philosophers of Europe. If they knew so little about the earth itself, it is not surprising that they knew so little about its inhabitants, as to compel us to seek for information concerning the early history of the aborigines of California, in countries which were ancient and civilized when Europe was inhabited by savages.

The Hindoo, Chinese, and Japanese annals all correspond in recording the fact, that about the year 1280, Genghis Kahn, a great Mongul Chief, whose name was a terror in Europe, at the same time, invaded China with hordes of barbarians from Tartary, and subjugated its people, whom his descendants hold in subjection at the present time. Having accomplished this object, he fitted out an expedition consisting of 240,000 men, in 4,000 ships, under command of Kublai Kahn, one of his sons, for the purpose of conquering Japan. While this expedition was on the passage between the two countries, a violent storm arose, which destroyed a great part of this fleet, and drove many of the vessels on to the coast of America. (The writings of Marco Polo contain much information concerning this event.)

Grotius says, "the Peruvians were a Chinese colony, and that the Spaniards found at the entry of the Pacific Ocean, on coming through the straits of Magellan, the wrecks of Chinese vessels."

There are proofs clear and certain, that Mango Capac, the founder of the Peruvian nation, was the son of Kublai Kahn, the commander of this expedition, and that the ancestors of Montezuma, of Mexico, who were from Assam, arrived about the same time.

But for the fanaticism of the Spanish priests, who destroyed all the Mexican records, when Cortes captured the city, there would be less obscurity on this interesting subject than exists at present.

Every custom of the Mexicans, described by their Spanish conquerors, proves their Asiatic origin. They had no written language, but kept their records by means of *quipos*—bundles of strings, with knots of various colors—precisely similar to those used by the Chinese at that period. Their ceremonies—civil, military and religious—their music, weapons, names of their deities, food, ornaments, toys, their system of notation, and method for calculating time, their agricultural implements—even to the making of adobes—all were identical with those of China.

The strange hieroglyphics found in so many places in Mexico, and from California to Canada, are all of Mongolian origin. Similar figures exist in Siberia, at Nepaul, in India, and in Thibet, which are known to have been made by the Mongolians. They were the usual signs made by that race to mark their subjugation of a country. Humboldt, many years ago, conjectured that these hieroglyphics were of Tartar origin. It is now positively known that they are.

But, by far the most interesting feature of these recent revelations about the ancient history of California and Mexico, is the strange fact that many of the Tartar invaders of these countries were Christians.

We have already shown the connection between the ancient Peruvians and Mexicans, and we must again refer to this connection to trace this fact. It is recorded by Vega, the best historian of Peru, that among the booty obtained by the Spaniards from the palace of the Incas, was a beautiful jasper, or marble cross, highly polished, three fourths of an ell in length, and three fingers in breadth, which was kept in the sacred chamber of the palace, and held in great veneration. (Vega—vol. ii: chap. 3.)

To account for this extraordinary discovery: Marco Polo says, there were many Nestorians in the service of Genghis Kahn, and it is probable that in the expedition sent to conquer Japan, a part of the troops were commanded by Nestorian officers. The mother of Kublia Kahn's brother, (the Kahns had many wives), who was uncle to Mango Capac—the first Inca of Peru—was a Christian. It is known that she had in her employ an English goldsmith of great skill, named William Bouchier, who made many of the gold and silver articles which fell into the hands of the Spaniards.

Humboldt refers to the Mexicans having some confused idea of Christianity—the origin of such ideas is here explained.

The New York *Herald*, in November, 1866, contains a communication from Mexico, concerning a discovery made by a person named Lyon, about three hundred miles to the north-east of Jalapa, of ruins of Christian places of worship, which had been abandoned before the conquest of Mexico by the Spaniards. Among these ruins were found a statuette of a man, with the emblems of Christianity—the cross, lamb, etc.—carefully carved.

Grixalva, who was in Yucatan in 1518, states that there were many great stone crosses in the country at that time, and that the people worshipped them. The Spaniards, under Cortez, found many such crosses in Mexico.

In the Odd Fellows' library at San Francisco, there is an old book, published at Loraine, in 1579, which contains many strange stories about this country—then called Quivera. This curious book, written in Latin, contains the following remarkable passage, when referring to the efforts made at that time to find the straits of Anian: "The soldiers of Vasquirus Coronatus, having found no gold in Vivola, in order not to return to Mexico without gold, resolved to come to Quivera (California); for they had heard much of its gold mines, and that Tatarraxus, the powerful king of Quivera, was amply provided with riches, worshipped the Savior's cross, and the memory of the Holy Virgin."

In the museum at St. Petersburg, there is a great collection of gold, silver, copper, and stone articles, obtained from the tumuli of the ancient Moguls, in Siberia, which are identical in design, workmanship, and materials, to similar articles found under like circumstances in Peru, Mexico, and California.

The observations of the expedition to Alaska, in 1867, revealed the fact that the inhabitants of the Alutian islands are of unquestionable Mongolian or Japanese origin—thus substituting verity for conjecture as to the probable origin of the aborigines of the Pacific coast.

The curious *casas grandes*, or large stone houses which are known to exist near Culiacan, Mexico, and along the Gila river, the cause of so much astonishment to all Americans who had seen them, are the very counterparts of buildings erected by Mongolians in Thibet, where they remain at the present time.

The armor belonging to Montezuma, which was obtained by Cortez, and is now in the museum at Madrid, is known to be of Asiatic manufacture, and to have belonged to one of Kublai Kahn's generals.

We could furnish an almost endless number of facts to support the belief, that the Indians whom the Spaniards found in California, were of Asiatic origin; but, as our work is not published as a history, we are compelled to restrict our remarks on this point. We hope, however, that we have furnished sufficient detail to excite the interest of the reader in the subject.

The Chinese, who have become so numerous in California since the discovery of gold, bear a striking resemblance to the Indians, and are known to be able to converse with them, in their respective languages, to an extent that cannot be the result of mere coincidence of expression. This also furnishes a strong confirmation of what we have stated above.

In 1857, a gentleman named Henley—a good Chinese scholar, who acted as interpreter in the courts of this State for some time—published a list of words in the Chinese and Indian languages to show that they were of the same origin. From this list we make an extract as supporting our remarks :

| Indian. | Chinese. | English. | Indian. | Chinese. | English. |
|---|---|---|---|---|---|
| Nang-a. | Nang. | Man. | A-pa. | A-pa. | Father. |
| Yi-soo. | Soa. | Hand. | A-ma. | A-ma. | Mother. |
| Keoka. | Keok. | Foot. | Ko-le. | A-ko. | Brother. |
| Aek-a-soo. | Soo. | Beard. | Ko-chae. | To-chae. | Thanks. |
| Yuet-a. | Yuet. | Moon. | Ngam. | Yam. | Drunk. |
| Yeeta. | Yat. | Sun. | Koolae. | Ku-kay. | Her. |
| Utyta. | Hoto. | Much. | Koo chue. | Chue-koo. | Hog. |
| Lee.lum. | Ee-lung. | Deafness. | Choo Koo. | Kow-chi. | Dog. |
| Ho-ya-pa. | Ho-ah. | Good. | | | |

Ti-yam, in the Indian language, is night. Ti-yam, in the Chinese, means the God of the moon, or night. Hee-ma, in Indian, is the Sun. Hee-ma, in Chinese, means the God of the Sun, or day. Wallae is a word commonly used among the Indians to designate a friend ; it also means man. Walla, in the Hindostanee, means a man. Numbers of other words could be given, but the above are sufficient for our purpose. "Alta," the prefix which distinguishes Upper from Lower California, is a word of Mongolian origin, signifyimg gold.

In 1813 the British brig *Forester*, bound from London, England, to the Columbia River, fell in with a dismasted Japanese junk of about seven hundred tons burden, some one hundred and fifty miles off this coast, near Queen Charlotte's Island. There were three persons on board of her alive, who stated they had been eighteen months drifting about, during which time they had been in sight of the American continent, but were driven off by the winds and currents. In 1833, another Japanese junk drifted into the harbor of one of the Hawaiian Islands, having four of her crew alive, after being at sea for eleven months.

The early settlers in Oregon found the remains of a Chinese junk imbedded in the mud of the Columbia River, several miles from the coast. The Indians had a tradition about this junk—that it came "filled with strange men," many years previously, but nobody knew whence they came, or where they went.

These instances of Chinese and Japanese vessels reaching this coast so recently, is certainly a proof that they may have done so in earlier times; as both China and Japan had larger fleets of vessels in those days than at present.

## THE EARLY SETTLERS.

The advent of settlers, independent of the missions--the connecting links between the past and present civilization—furnishes material for an exceedingly romantic and interesting chapter of the early history of California.

Who would not like to know the nationality and name of the first adventurer whose eyes beheld the blue waters of San Francisco's noble bay, breaking over its sandy, crescent-shaped beach, now covered with long lines of stately structures—the seat of a commerce world-wide in extent; and of him who first, on some autumn eve, after the early rains had fallen, climbed the russet hills, and beheld the unequalled landscape that surrounds it, then so silent, now the center of so much activity? Was he some bold mariner cast away on the dreary coast, seeking food and shelter, or some wandering trapper from the western wilds, who had traversed the broad continent in search of peltries to barter for powder and lead? Unfortunately, there were no records kept of such "pathfinders," through whose enterprise and energy the world first heard of the natural wealth of California. It was they who spread abroad the stories about the beauty of scenery, fertility of soil, salubrity of climate, and abundance of game in this, then unknown country, which excited the curiosity of the bold frontiersmen of the west, and of the venturesome merchant of the north, which led to the settlement of the country by the Anglo-Saxon race.

At first, like the few plashing drops which precede the refreshing rain that falls in spring time, imparting vigor and beauty to the products of the earth, these wanderers appear on the scene. Received by the secluded missionaries as premonitions of a civilization opposed to that growing so rankly on the virgin soil, every means were used to keep their influence out of the mission folds; but, little by little, their numbers increased, until the few spattering drops became a shower, and the shower a deluge, which ultimately overwhelmed both missions and missionaries, and planted a new race, with more progressive institutions in their places.

How new the country seems, when we consider that there are men still living among us, hale and vigorous, who have stood face to face with those who first planted the standard of Christian civilization on its soil. Yet, how mature it is, when measured by its commerce, arts and manufactures, the order of its government, and refinement of its society.

To explain the causes which led the first citizens of the United States into the territory now forming the State of California, it is necessary to refer to the following events in the early history of the Pacific coast:

Vitus Bering, a Dane, was employed in the year 1728, by the Empress Catharine, of Russia, to explore the northwest coast of America and Asia, for the purpose of finding a connection between the Pacific and Atlantic oceans, which was supposed to exist, but had not, at that time, been found. It was on this voyage that he discovered the straits which bear his name, and settled all doubts on that question. The skins of otters, sables, beavers, and other rare animals, which Bering collected on this coast during the voyage, and lay at the feet of the Empress on his return, were so valuable, and the abundance of the animals that produced them was represented to be so great, that the discovery excited the curiosity of the capitalists, navigators, and adventurers of Europe, and several nations established settlements on the Pacific Coast, for the purpose of collecting these valuable furs. The Russians selected the territory recently ceded by them to the United States. The Russian American Fur Company was organized in 1799, with power to hunt all over that territory. Sitka was founded in 1805, by this company. The Austrians and Danes were their neighbors for many years. The English soon followed. In 1784, a company was organized in London, called the King George's Sound Company, for the purpose of making a settlement on this coast, and trading for furs. Several ships belonging to that company arrived between 1780 and 1790. The English East India Company also sent several of their ships here between 1784 and 1790. About the year 1790, vessels from the United States began to make their appearance on the coast of the Pacific, in search of furs. As early as 1784, Thomas Jefferson, then acting as United States Minister to the Court of France, had become deeply interested in the subject, from reports of the country made by John Ledyard, a native of Connecticut, who had been on the coast with Captain Cook, the celebrated English navigator. Jefferson engaged this John Ledyard to make a journey through the Islands along Nootka Sound, for the purpose of obtaining accurate information of the country. The Russians, being made aware of Jefferson's object, had Ledyard arrested on the 24th of February, 1788, while making explorations on the borders of what is now Washington Territory.

On June 5th, 1791, the ship *Columbia*, from Boston, (Mass.), commanded by Captain Robert Gray, arrived on this coast, at a place called Clyoquot, near the entrance to the straits of Fuca, and traded up and down the coast during the following spring and summer. It was while on one of these trading excursions, to buy furs from the Indians, that Captain Gray, on the 7th of May, 1792, discovered the Columbia river, which he named after his ship, the first that ever sailed up its stream. The report of this discovery, and the valuable collection of furs Captain Gray brought from this country to Boston, created considerable excitement; and a number of expeditions were planned for making a settlement on this coast.

In 1810, the ship *Albatross,* from Boston, commanded by Captain Smith, arrived with a number of hunters and trappers, who landed and formed a settlement at a place called Oak Point, on the south bank of the Columbia river, about forty miles from its mouth, where they established a trading post, which was the first settlement of Americans on the Pacific Coast.

In 1810, the Pacific Fur Company was organized at New York, under the leadership of John Jacob Astor; and in 1811, Astoria, Oregon, was founded by this Company, at the place where it stands at the present time. It was soon after captured by the British, who drove all the Americans out of the country. Many of these managed to find their way into California. One of the most successful of these pioneer California fur-traders, was Captain William Sturgis, who, in some half-dozen voyages, between Boston and the California coast, between 1800 and 1812, realized so large a fortune as to become one of the richest merchants in the city of Boston. He died at Boston, in 1864, aged seventy-five, and left property valued at three millions of dollars.

From 1813 until 1822, there were no Americans on the Pacific coast, except those connected with these trading posts, or deserters from vessels that visited them.

The following sketch of the "California trade" in those early days, will be interesting. From 1825 until 1834, the whole of this trade was in the hands of a few Boston merchants. A voyage to this coast and back, during that time, was an enterprise of very uncertain duration, generally occupying two or three years. The outward cargo, which usually consisted of groceries and coarse cotton goods, had to be retailed to the missionaries and settlers, as there were no "jobbers" in those times, and neither newspapers, telegraphs, nor stages, through which to inform customers of the ship's arrival. The crew had to travel all over the country to convey the news, which occupied considerable time. It was this portion of their duties that caused so many of them to desert their ships. They saw so much of the country, became so charmed with the freedom, ease, and plenty, that prevailed everywhere, that they preferred to remain on shore. Each of these vessels generally brought several young men as adventurers, who worked their passage out for the privilege of remaining. Many of the early settlers, whose children are now among the wealthiest citizens in the State, came to California in this manner. It was in one of these California hide-ships, the *Alert*, that R. H. Dana served his "two years before the mast," in 1835 and '36, in the book concerning which, he gives some interesting scraps of information of early California society.

The outward cargo being disposed of, the homeward one had to be procured. Sometimes, when the season had been too dry, or too wet for the lazy vacqueros to drive the cattle into the missions to kill, there were no hides or tallow to be had. On such occasions the vessel was obliged to remain till the next season, when a sufficient number of cattle would be slaughtered to pay for the goods purchased, as there was no "currency" used in the country, except hides and tallow.

It was rough travelling in California, in those days, there being no places for the traveller to obtain food or shelter, except at the missions. In 1822, there was neither bread, butter, fruit, nor vegetables, to be had at Monterey, the capital of the territory. In fact, there was not a hotel or public table in the whole country, when it came into the possession of the United States in 1846. San Diego, being the general depot for this trade, where the hides and tallow collected from all the other missions along the coast were stored until a vessel was ready to leave, it was necessary to make several trips up and down the coast before the cargo could be collected. As there was no lumber or barrels to be had, the tallow was enclosed in green hides, sewn up in packages of one hundred and fifty to seven hundred pounds in weight, according to the size of the hide.

A number of stragglers from the Hudson Bay, and other companies—men of all nationalities—had found their way into California before 1812, and caused considerable trouble to the missionaries, by taking the best looking squaws for housekeepers.

It is known that several of the crew of Vancouver's ship deserted, while that celebrated navigator lay at anchor in the harbor of Monterey, in 1793. These men lived among the Indians for a number of years.

In 1803, the American ship *Alexander*, Captain John Brown, and the *Aser*, Captain Thomas Raben, entered the harbor of San Francisco, and increased the number of settlers by deserters from their crews. Captain Brown, of the *Alexander*, it appears, had lived among the natives for several years before his arrival on that occasion, and had caused so much trouble to the missionaries and military authorities at San Diego, in 1803, by contraband trading, that he was denied permission to remain in the harbor, longer than was necessary to obtain a supply of wood and water. These were the first American vessels that entered the Golden Gate, but not the first that had visited California. Captain Cleveland, on board the brig *Delia Byrd*, of Salem, (Mass.,) arrived at San Diego on the 17th of March, 1803.

In 1807, the ship *Juno*, of Rhode Island, which had been purchased by the Russians at Sitka, arrived at San Francisco, having on board Count Von Resenoff, ambassador from that country to Japan. This individual remained several weeks in California, and became so charmed with the country and its inhabitants, that he made arrangements for founding a colony of Russians in what is now Sonoma county, and engaged to marry the Donna Concepcion Arguello, the beautiful daughter of the Spanish commandante at San Francisco; but, being accidentally killed in Siberia, while on his way to Russia to obtain the Emperor's permission to settle in California, the marriage never took place. The beautiful donna, on learning the fate of her lover, renounced the world, became a Sister of Mercy, and devoted her life to alleviating the sufferings of the sick, and educating the children of the poor, until she died at Benicia, in 1860. The death of Count Von Resenoff also deferred the establishment of the colony till the year 1812, when one hundred Russians, and one hundred Kodiac Indians, arrived from Sitka and settled on a spit of land, about thirty miles from the shore of Bodega Bay, in latitude 38° 18′—fifty-eight miles north-west from San Francisco. They came for the purpose of catching seal, otter, beaver, and other animals, the fur of which was very valuable; and the animals that produced them abounded on all the rivers and creeks on the coast at that time. They were unwelcome guests to the missionaries and Mexican Government, but appear to have ingratiated themselves into favor with the Indians, a great many of whom they employed trapping and hunting, and cultivating the land around their fort.

In 1820, they formed another settlement on the river Sebastian, forty miles north of Bodega, which they named Slawianska; Fort Ross, as it was called by the settlers; or Mount Ross, as it is known at present. They also had a settlement on the Farralones. In 1841, these settlements contained eight hundred Russians, and nearly two thousand Indians. They exported a large number of skins, and considerable quantities of grain and meat to the Russian settlements at Sitka.

In 1835, the British Government, which had already begun to make arrangements for the acquisition of California, made objections to these Russian settlements on Mexican soil; and, as the Mexican authorities appeared to be unable or unwilling to molest them, called upon the United States Government to require their removal, in compliance with the stipulations of a treaty made between Russia and the United States in April, 1824, by which Russia was bound to prevent its subjects forming settlements at any point south of latitude 50° 40′. It was in compliance with a request from the United States Government, that the Russians left California in 1841. They sold all their real and personal property to General Sutter, taking payment in wheat and meat, as required by the settlement at Sitka. Among the personal property thus acquired by Sutter, were 2000 cattle, 1000 horses, 50 mules, 2500 sheep, and a number of brass guns, one of which, now preserved in the museum of the Pioneer Association of San Francisco, rendered important service during the war for the conquest of California.

The first permanent settler in California, of whom we have any record, was John Gilroy, a Scotchman, who was landed from an English ship belonging to the Hudson Bay Company, which put into Monterey for supplies, in 1814. Gilroy, at that time a youth of eighteen, was so sick with the scurvy that he was left ashore, to save his life. It was six years after the ship that brought him had left, before another entered the harbor of Monterey, except a pirate from Buenos Ayres, which arrived in 1819, captured the fort, destroyed the guns, plundered the inhabitants, and burnt the town. Gilroy, who is still living at the thriving town which has sprung up within a few miles of his homestead, in the beautiful Santa Clara valley, about thirty miles from San José, says there were not half a dozen foreign settlers in the whole country at that time, except the Russians, at Bodega, and only eight ranchos belonging to Mexican settlers, between San Francisco and Los Angeles. Monterey contained but six houses, besides the presidio;. San José contained about twenty. There was no foreign trade, except once a year a Spanish vessel took a cargo of tallow to Callao. Hides had not begun to be of any value, as the American traders did not commence to buy them until about 1820. There was not a flour mill in the country; the wheat intended for flour was ground in rude stone mortars, or *metates.* There was not a vehicle, from San

Francisco to San Diego, that had wheels with spokes. All the lumber required for any purpose was hewn with axes by the Indian carpenters—but, as nobody except the Governor or missionaries had wooden floors or doors to their houses, nor chairs, nor tables, it did not require much lumber to supply the demand. The missionaries owned the whole country, and controlled all its inhabitants. The Indians did all the work required, as blacksmiths, carpenters and weavers. Potatoes were unknown ; a few cabbages and other vegetables were cultivated, on some of the missions, as luxuries. The natives at the missions lived entirely on boiled wheat, maize, and beef, seasoned with Chili peppers and salt. Poor Gilroy, like so many other pioneer settlers who owned miles of fertile land when California became a State in the American Union, is now penniless, living in the same old adobe house he built before an American citizen had set his foot in the territory. Improvidence, and want of experience in the ways of the money lender, have ruined nearly all of the old settlers.

In 1818, Antonio M. Suñol, whose name is for ever connected with a charming valley in the coast range, arrived at Monterey, and resided in California until March 18th, 1865, when he died, near San José, at the age of sixty-eight. This worthy old pioneer, and his friend General Sutter, are fine specimens of the generous, refined and chivalrous adventurers of a nearly extinct type, whose histories show what an active part such men play in the drama of life. Though born at Barcelona, in Spain, he was in the naval service of France, and was present when Napoleon the Great surrendered as a prisoner, before the hero's exile to St. Helena.

In 1821, F. W. Macondray, the founder of one of the most extensive and substantial mercantile firms on the Pacific Coast, arrived at Monterey, from Chili, on board the ship *Panther*, and was so impressed by the beauty and fertility of the country that, in 1850, he brought out his family, and settled at San Francisco, where his sons are at present, among its wealthiest merchants.

In May, 1822, W. E. P. Hartnell, an Englishman—the first inspector and translator of the Mexican archives, for the United States Government—arrived at Monterey ; in August of the same year, W. A. Richardson, an Englishman, who became the first Harbor Master, landed at San Francisco.

In May, 1823, J. B. R. Cooper, a half-brother of Thos. O. Larkin, arrived at Monterey, from Boston, (Mass.,) and soon after married a sister of M. G. Vallejo, a prominent native Californian of pure Castilian descent.

General Mariano Guadalupe Vallejo, who took an active part in placing California in possession of the United States, was born at Monterey, July 7th, 1808, and is the oldest living Spanish settler in the State. Having held several important offices under the Mexican Government, he was dissatisfied with its rulers, and became one of the most active leaders of the native Californian party which favored the annexation of the country to the United States. Being one of the best educated of his class, and speaking English fluently, he was able to render much service to the Government in the conquest and settlement of the territory.

The following is an illustration of General Vallejo's services, in favor of annexation to the United States. In 1846, when the subject of annexation to England was discussed before the Departmental Assembly at Santa Barbara, and Pio Pico, the Governor, after reviling the United States and praising the monarchies of Europe, proposed to unite with England, General Vallejo, in the course of his reply to the Governor, said:

> "We are republicans; badly governed and badly situated as we are, still we are all, in sentiment, republicans. So far as we are governed at all, we at least profess to be self-governed. Who, then that professes true patriotism will consent to subject himself and children to the caprices of a foreign king and his official minions? My opinion is, I will mention it plainly and distinctly, annexation to the United States is our only security. Why should we shrink from incorporating ourselves with the happiest and freest nation in the world, destined soon to be the most wealthy and powerful? When we join our fortunes with hers, we shall not become subjects, but fellow-citizens, possessing all the rights of the people of the United States. Look not, therefore, with jealousy upon the hardy pioneers who scale our mountains, and cultivate our unoccupied plains; but rather welcome them as brothers who come to share with us a common destiny."

In a few months after this meeting, California was in possession of the United States.

About the time of the arrival of Mr. Cooper, quite a respectable trade had sprung up for hides, tallow, grain, wine, and other products of the missions. In 1822, an English firm at Lima, (Peru,) established a branch of their house at Monterey, which was the first mercantile house opened on the coast. The annual exports, for several years, had averaged 30,000 hides, 7000 quintals of tallow, 200 bales of furs, and about 1,000 bushels of wheat, besides a few cargoes shipped to Sitka, from the Russian settlements at Bodega.

In 1820, numerous hunters and trappers from the west, while wandering in search of the posts on the Columbia river, found their way across the Sierra Nevada, into California.

The valleys of the Tulare, San Joaquin, and Sacramento, in those days abounded with beaver, otter, and other animals, whose pelts were highly prized by these trappers, who had become so numerous in 1821 and 1822, as to produce quite a revenue to the Mexican Government, which charged them a license for the privilege of hunting. It was from some of these California trappers whom General Sutter met in New Mexico, in 1834, that he first heard of the beauty of the valley of the Sacramento, on which he settled in August, 1839.

Many of the oldest settlers in the State at present, or who have died within the past year or two, came to California as trappers. The American River takes its name from a company of western trappers who lived on its banks for several years, between 1822 to 1830. French Camp, or Castoria, as it used to be called, near Stockton, San Joaquin County, was located by a company of trappers employed by the Hudson Bay Company, who encamped there from 1829 till 1838.

In 1827, John Temple, a native of Reading, (Mass.,) arrived at San Francisco, from the Sandwich Islands. The career of this gentleman so forcibly illustrates the material of which the early pioneers of California were composed, that we give an outline of his history. A merchant at Los Angeles until 1848, he then commenced the business of stock-raising, to meet the increasing demand for cattle, the extraordinary accession to the population created. In a few years he became the owner of many thousands of cattle and horses—such men never do things by halves. He next tried his hand as a builder, and the City Hall, Court House, and Temple Block, at Los Angeles, are monuments of his labors in this line. He next leased a Government mint in Mexico, and went into the coining business, in which he literally "made money." Like all the early settlers, Mr. Temple (in 1830) married a California lady. He died at San Francisco, in June, 1866.

In February, 1829, Alfred Robinson arrived at Monterey, on board the ship *Brookline,* from Boston, as agent for the house of Bryant & Sturgis. In 1836, this gentleman married the daughter of José de la Guerra, at Santa Barbara, and returned to Boston in 1837. In 1849, Mr. Robinson came back to California, and settled at San Francisco, as the first agent of the Pacific Mail Steamship Company.

Abel Stearnes came to Monterey, from Mexico, in July, 1829, for the purpose of locating a grant of land he had received from the Mexican Government. Failing in this colonization project, he went to Los Angeles, where he has since resided and amassed a fortune.

J. J. Sparks, who died at Santa Barbara in June, 1867, came to California as a trapper in 1830.

George C. Yount, the first settler in Napa Valley, after wandering as a trapper and hunter through the valleys of the Platte, Arkansas, Green, Colorado, Mojave and Sacramento, in 1830 reached the beautiful place where he settled and ended his days, surrounded by as much refinement and social cultivation as if all his days had been spent in what the world calls society. His neighbor, Nathan Coombs, the famous ranchero of that valley, did not arrive in California till 1843.

J. J. Warner, Esq., the well known viniculturist, and Federal Assessor of Los Angeles, was a trapper on the Sacramento River in 1831. Trapping for beaver and otter was carried on, on the Sacramento and San Joaquin Rivers, until 1845. Captain Merritt had a large party of trappers on the Sacramento in that year.

The name of one of these early trappers, Jedediah S. Smith, has been mixed up with a number of stories of a very contradictory character, but each vouched for as correct by gentlemen deserving belief. The late Edmund Randolph, in a famous oration delivered before the Pioneer Association of California, credits Smith with being the first white man who crossed the Sierra Nevada mountains.

We have been at considerable trouble to unravel these various stories, and have gathered the following particulars from those who knew Smith personally, and shared his perils, and from documents in the State archives.

The first of the trappers in the country west of the Rocky Mountains was W. H. Ashley, of St. Louis, who left the Missouri River in 1823, and is supposed to have reached the Sierra Nevada mountains in that year. In 1824 he discovered Salt Lake, and built a fort and station there, between which and the Missouri River, loaded wagons passed as early as 1828. In 1826, Ashley sold his interest to this Jedediah S. Smith, Jackson, and Sublette, who formed the American Fur Company.

In 1824, this Company was organized at St. Louis, (Mo.) It immediately sent out several parties, to trap or hunt in the country west of the Rocky Mountains. In the spring of 1825, Smith, who was at the head of this Company, with a party of forty trappers and Indians, left their rendezvous on the Green River, near the South Pass, and pushed their way westward, crossing the Sierra Nevada into the Tulare Valley, which they reached in July, 1825. The party trapped for beaver, and other animals, from the Tulare to the American fork of the Sacramento, where there was already a camp of American trappers. Smith established his camp near the site of the present town of Folsom, about twenty-two miles north-east from the other party.

From this camp Smith sent out parties, in several directions, which were so successful that, in October, leaving all the others in California, in company with two of the party he returned to his rendezvous on Green River, with several bales of skins. His partners were so pleased at the success of the first expedition that in May, 1826, Smith was sent back with a considerable re-inforcement. On this trip, he led his party further south than on the former one, which brought them into the Mohave settlements on the Colorado, where all the party, except Smith and two companions named Galbraith and Turner, were killed by the Indians. These three made their way to the mission of San Gabriel, on the 26th of December, 1826, where they were arrested on suspicion of being spies or filibusteros, and sent to the Presidio at San Diego, where they were examined by General Echandia, the commandante of the territory. It was not until several Americans, who were then at San Francisco, certified that Smith and his companions were hunters and trappers, that they were permitted to purchase horses and provisions, to proceed to the camp at Folsom.

The following is a verbatim copy of this curious certificate:

"We, the undersigned, having been requested by Capt. Jedediah S. Smith to state our opinions regarding his entering the Province of California, do not hesitate to say that we have no doubt but that he was compelled to, for want of provisions and water, having entered so far into the barren country that lies between the latitudes of forty-two and forty-three west that he found it impossible to return by the route he came, as his horses had most of them perished for want of food and water; he was therefore under the necessity of pushing forward to California—it being the nearest place where he could procure supplies to enable him to return.

"We further state as our opinions, that the account given by him is circumstantially correct, and that his sole object was the hunting and trapping of beaver, and other furs.

"We have also examined the passports produced by him from the Superintendent of Indian affairs for the Government of the United States of America, and do not hesitate to say we believe them perfectly correct.

"We also state that, in our opinion, his motives for wishing to pass, by a different route to the Columbia River, on his return is solely because he feels convinced that he and his companions run great risk of perishing if they return by the route they came..

"In testimony whereof we have hereunto set our hands and seals, this 20th day of December, 1826.

"WILLIAM G. DANA, Captain of schooner *Waverly.*
"WILLIAM H. CUNNINGHAM, Captain of ship *Courier.*
"WILLIAM HENDERSON, Captain of brig *Olive Branch.*
"JAMES SCOTT,
"THOMAS M. ROBBINS, Mate of schooner *Waverly.*
"THOMAS SHAW, Supercargo of ship *Courier.*"

In the summer of 1827, Smith and all his party, (except Galbraith and Turner, who settled in California,) left the Sacramento valley, with the intention of reaching the settlements on the Columbia river. They reached the mouth of the Umpqua river, near Cape Arago, when the party were surprised by Indians, and all killed, except Smith and two Irishmen named Richard Laughlin and Daniel Prior. These, after terrible sufferings, reached Fort Vancouver, where they were kindly received. Smith, soon after, returned to St. Louis, and his companions went to Los Angeles, California., where they resided for several years.

Another version of the story is, that Smith returned from Fort Vancouver to the place where the party were killed, accompanied by a strong force of men in the service of the Hudson Bay Company, who, meeting no Indians on the way, went with him as far as the Sacramento valley, where they established a camp near the junction of the American and Feather Rivers, which was, during the first season, under command of a Scotchman named McLeod. This was the first party of Hudson Bay trappers known to have been in California.

Thomas Sprague, an old resident of California, in a letter to the Hon. Edmund Randolph, dated "Genoa, (Washoe,) Sept. 18th, 1860," states that Smith was the chief trader in the employ of the American Fur Company, at its rendezvous on the Green River, in 1825; and in that year was sent, with a party of trappers, to hunt in the country west of Salt Lake. It was during that trip that he discovered the Humboldt River, which he called the Mary, in compliment to his Indian wife. This river is still known as the Mary, by the old hunters in Utah. It was always called by that name till Fremont changed it in 1846. Traveling west from the Humboldt, he crossed the Sierra Nevada, at a point near the head of the Truckee river, and went down the Sacramento Valley, and as far south as San José and San Diego, and obtained horses and supplies to return. Coming back, he crossed the Sierra Nevada mountains, by what is now known as Walker's Pass, and discovered Mono Lake, between which and Salt Lake he found placer gold, of which they took a considerable quantity to the rendezvous of the company on Green River, or Sidskadee, one of the head waters of the Colorado. This gold, and the large quantity of furs brought by the party, so pleased the agent of the company, that Smith was directed to return to the place where the gold was found, and thoroughly prospect the country. Sprague states that it was on this second trip that Smith wrote the letter to Father Duran, of the San Gabriel Mission, which Mr. Randolph read at the celebration of the Pioneers at San Francisco, in 1860, and which is still preserved. The following is a copy of this letter:

"Reverend Father:—I understand, through the medium of one of your Christian Indians, that you are anxious to know who we are—as some of the Indians have been at the mission and informed you that there were certain white people in the country. We are Americans, on our journey to the River Columbia. We were in at the Mission San Gabriel, in January last. I went to San Diego and saw the General, and got a passport from him to pass on to that place. I have made several efforts to pass the mountains, but the snows being so deep, I could not succeed in getting over. I returned to this place—it being the only point to kill meat—to wait a few weeks until the snow melts, so that I can go on. The Indians here also being friendly, I consider it the most safe point for me to remain until such time as I can cross the mountains with my horses—having lost a great many in attempting to cross ten or fifteen days since. I am a long ways from home, and am anxious to get there as soon as the nature of the case will admit. Our situation is quite unpleasant —being destitute of clothing and most of the necessaries of life, wild meat being our principal subsistence. I am, Reverend Father, your strange but real friend, and Christian.

"May 19th, 1827. J. S. SMITH."

Mr. Sprague says, the party reached the place where the gold was found, when, in a battle with the Indians, Smith, and nearly all his party were killed. Greenhow, in his "History of Oregon and California," says Smith was killed by the Indians northwest of Utah Lake, in 1829. Both Sprague and Greenhow were evidently misinformed on the subject, as it is known by Mr. Smith's acquaintances, some of whom still live in California, that he returned to St. Louis in 1830, where he sold out his interest in the fur company, and, in 1831, left Missouri, with eleven wagons and mule teams, laden for Santa Fé, and was killed by Indians, while on this journey, on the Cimeron river, near Toas.

In 1825, another company of trappers, under the command of James O. Pattie, started from the Mississippi valley to reach the Pacific coast, overland. But, keeping too far to the south, they passed through New Mexico into the valley of the Gila, where they were plundered by the Yuma Indians, and escaped by means of rafts, which carried them down that river to its junction with the Colorado. A report of this expedition, published at Cincinnati, in 1832, under the title of the "Hunters of Kentucky," was greatly instrumental in attracting the attention of emigrants to this coast. The particulars of Pattie's journey were published with President Jackson's message to Congress, in 1836. The subject of emigration to the Pacific coast at that time occupied much of the attention of Congress.

Walker, whose name is wedded to so many localities in the State—and who still resides in it; Pauline Weaver, the pioneer of Arizona; Kit Carson, Maxwell, and Bill Williams, whose name is famous in the regions of the Colorado River, were all men of this class, several of whom probably hunted in California before Smith.

Having devoted as much space to this subject as the object of our work will permit, we must proceed with our outline of the history of the early settlers of California.

The large quantities of tallow which were received at Callao, known to be the product of cattle killed expressly to procure it, attracted the attention of John Begg & Co., an enterprising English firm at Lima, Peru, who, in 1824, entered into a contract with the Peruvian Government, to supply it with California salted beef, for the use of its army and navy. To carry out this object, Messrs. McCulloch & Hartnell established a packing house at Monterey, in the fall of 1824, and imported about twenty salters and coopers from Ireland and Scotland to conduct the business. It was for this work that Mr. David Spence, a well known citizen of Monterey, came to California from Lima, on the 29th of October, 1824, and has remained there ever since.

This pioneer packing establishment shipped several cargoes of meat to Peru, which were pronounced of excellent quality, but the government of that country, at that time, had no funds to pay for its supplies, the contract was broken, and the business ended in 1825. At first, the company used salt imported from Peru, but it was soon discovered that California produced a much better article.

In September, 1828, Timothy Murphy arrived at Monterey, from Lima, and was employed as a clerk by Messrs. McCulloch & Hartnell.

In 1829, Jean Louis Vignes, a native of Bordeaux, France, the founder of the well known house of Sansevain & Co., the pioneer wine makers, arrived at Monterey, from the Sandwich Islands, but removed to Los Angeles in 1831, where he died in 1863, aged eighty-two years. The missionaries in the southern counties had made both wine and spirits for several years prior to the arrival of M. Vignes, but he was the first to make these articles as a business, in California. In 1846, he had the largest vineyard in the whole of Upper California. His nephew, Don Luis Sansevain, who had been many years connected with M. Vignes in the management of the business, has become famous for the quality of the wine made from the pioneer vineyard.

The subject of emigration from the States east of the Rocky Mountains to the territory on the Pacific Coast, had occupied the attention of Congress for many years before California came into possession of the United States. As far back as 1820, Mr. Floyd, who was then a Representative from the State of Virginia, offered a bill "favoring emigration to the country west of the Rocky Mountains, not only from the United States, but from China."

The reports circulated concerning the country had, as early as 1825, induced quite a number of persons to find their way overland to the Pacific coast, so that, before 1830, there were nearly five hundred foreigners on the west side of the Sierra Nevada mountains. In 1831, Los Angeles, then the largest town in the Territory, contained about twelve hundred inhabitants, a large proportion of whom were foreigners. San José contained five hundred, and one half of these were foreigners. There were also a few at Branciforte, a pueblo founded near the Mission of Santa Cruz. These were all the towns in the Territory at that time. The first house in San Francisco was not erected until 1835. The foreign population did not increase much during the succeeding ten years—as we find by M. De Mofras' reports to the French government, written in 1841, that he estimated them at only one thousand, divided among the following nationalities : Americans from the United States, 360 ; English, Scotch and Irish, 300 ; Spaniards from Europe, 80 ; Germans, Italians, Portuguese and Sandwich Islanders, 90 ; Mexicans, 170 ; and about 4,000 half-breeds. All the early settlers intermarried with the natives. The number of children in some of these mixed families was extraordinarily large. The wife of one prominent American, at Monterey, had twenty-two; the wife of another had twenty-eight; the wife of Mr. Hartnell, the United States translator, had twenty, all alive when California came into possession of the United States. Many of these half-breeds were of extraordinary size, some of them being seven feet high, and stout in proportion, while the ladies, hundreds of whom are still living, are fine specimens of humanity.

At this time (1841) the district and presidio of San Diego, embracing the Pueblo of Los Angeles, contained 1,300 inhabitants ; that of Monterey 1,000 ; Santa Barbara, 800 ; San Francisco, 800 ; and about one thousand one hundred inhabitants were scattered throughout the interior. De Mofras says, in his report, that there was a large number of emigrants then on their way from the United States to California. The papers published in many of the Atlantic States, between 1835 and 1840, show that companies were formed in most of them for the purpose of aiding emigrants to reach the Pacific Coast. The settlement of this Territory was the most prominent subject before the people of the United States at that time. So numerous were the emigrants between 1832 and 1840, that the Mexican Government became alarmed, and placed every impediment in the way of their settlement. It is a notable fact, in this connection, that but few grants of land were made to Americans outside the pueblos during the twenty-four years the country was under Mexican control. It was during this period that many of the men whose names figure most conspicuously in the State, made their appearance in California.

On the 10th of March, 1832, Thomas O. Larkin, who did more than any other person towards annexing the country to the United States, arrived at San Francisco, and in company with his half-brother, J. B. R. Cooper, who had arrived at Monterey in 1823, erected the first flour mill in the Territory. In 1833, Mr. Larkin was married to Mrs. Rachel Holmes, of Boston, (Mass.,) who was probably the first American lady who came to California.

In 1836, J. P. Leese, who had been in business at Monterey for three years, came to Yerba Buena cove, as the site of San Francisco was then called, for the purpose of establishing a branch of his firm there. After removing the suspicions of the Mexican authorities, he selected a spot for his house at the corner of Clay and Dupont streets—the same lot on which the old St. Francis Hotel was afterwards built. This was the first house erected in San Francisco. W. A. Richardson, who had been appointed Harbor Master in 1835, had previously erected a shanty, by nailing a ship's foresail over a few redwood posts, a little to the north of Leese's house, between Clay and Washington streets. It was at the completion of Leese's house, that the stars and stripes were first hoisted on the soil of California, to celebrate the event. In April, 1837, Leese married a sister of General Vallejo. Their daughter Rosalie, was the first child born in San Francisco. The first child born in the State, both of whose parents were Americans, was Guadalupe V. Botts, born at Petaluma January 4th, 1846.

In 1833, Isaac Graham came from Tennessee, overland, and settled at Santa Cruz, where, in 1841, he erected the first saw-mill in California. In 1836, this Graham, and Juan Bautista Alvarado, a native Californian, who held a subordinate appointment under the Mexican authorities at San Francisco, overthrew the Mexican Government and declared California an independent State. Graham, with fifty American riflemen, and Alvarado with one hundred Californians, captured the Presidio of Monterey, with the Governor of the territory, and nearly six hundred Mexican soldiers. This conduct of Graham brought down the enmity of the Mexican Government upon all the Americans; and in May, 1840, about one hundred of them were arrested, and either sent to jail, at Santa Barbara, or transported out of the country. Graham, who was sent to San Blas, was brought back by the Mexican Government, and lived in Santa Cruz till November 8th, 1863, when he died, surrounded by an interesting family.

On the 2d of July, 1839, John A. Sutter, the most famous of all the pioneers of California, landed at Yerba Buena, with ten Americans and Europeans, and eight Sandwich Islanders, with whose aid, in 1839, he had built Sutter's Fort, near the site of the present city of Sacramento, which, within ten years after, became the Mecca towards which pilgrims from all countries, of all creeds and colors, bent their steps.

The life of General Sutter has been so replete with incidents, of such an extraordinary character, that his history seems more like a series of ingeniously contrived fictions, than a narrative of sober facts. Born in Germany, of Swiss parents, he became a captain in the grand army of France, and mingled with the *elite* of French society during the reign of Charles X.; but, prompted by an impulse which appears scarcely natural, in the very dawn of his manhood, when society has most attractions, he longed for some secluded spot in the wilderness, where he might build up an ideal world around him. It being impossible to find such a spot in Europe, with its false civilization, in which hypocrisy and pretence are the ruling elements of success, he wends his way to America, to find an untrodden field in its far western territory. Arriving at New York in 1834, within a month he is on his way to the much praised "Wide West," whose dense pine forests and boundless prairies were distasteful to him. He next goes to the semi-tropical region of New Mexico, whose parched, sand-covered plains, treeless hills, and savage Indians, drove him almost to despair. It was here, while pondering where next to go, that he met a party of wandering trappers who had seen California. They described its charms so vividly that he determined to find his way there. Proceeding to the Rocky Mountains, he joins a company of trappers bound for the shores of the Pacific Ocean, and, with them crosses the continent. But his guides led him to the cold, humid, and cheerless region of Fort Vancouver, from whence it was impossible then to reach California by land. Hearing that there was a trade between the Sandwich Islands and the land he sought, he makes a voyage to Honolulu, in order to reach the harbor of San Francisco. After many weary months of waiting, a vessel is at last ready to sail for the American coast, but not for California. It is bound for Sitka. Sutter takes passage, trusting to Providence, and by a remarkable accident, the ship is driven into San Francisco in distress, and he finds himself in California.

Here a new difficulty arose. Not a resident of the territory had seen its interior, or could tell him how to reach the spot his trapper friends had so vividly described. After weeks of search, on the 16th of August, 1839, he finds the old beaver hunter's camp, near the junction of the American and Sacramento rivers, which presented all the elements of the scene he had been wandering for five years to discover. Here he landed, and in a few months had constructed Sutter's Fort, made his *home*, and called it New Helvetia, in memory of the land of his fathers. By kindness and liberality to the natives who swarmed around him, he made them cultivate his lands, herd his cattle, and guard his property against the more fierce savages from the mountains. In this patriarchal style he lived for nearly ten years, surrounded by everything that could minister to his wants—numbering his cattle by thousands, and owning the land for miles, until—to him fatal day—one of his workmen found a few grains of gold in the soil, when, as if by magic, the whole scene was changed, and from a veritable Utopia, the beautiful Valley of the Sacramento became a Pandemonium. The mighty power of gold was never before exhibited as it was then. With a rapidity very remarkable, the news of the discovery reached the most distant countries, and in a few months there was scarcely a nation that did not have its representatives digging and washing for gold on Sutter's farm, which embraced an area of many miles square. Mankind have certainly been benefitted by the discovery of gold in California—but not so Sutter. That discovery involved him in ruin. It led to the destruction of his land, cattle, and laborers. From being the monarch of all he surveyed in the broad Valley of the Sacramento, it made him again a wanderer, with no means of support in his old age except a donation made by the State, which he had been so greatly instrumental in founding. The life of what living man has been more strangely eventful?

Between 1840 and 1845, the fame of California as an agricultural country had become generally known to the people of the United States, while its importance from a commercial and political point of view was fully appreciated by the Federal Government. Mr. Larkin, who was appointed United States Consul in 1844, had for several years previously kept the government fully informed of the acts of the agents of France and England, who were making arrangements for one or the other of these nations to take possession of the country. Emigration was encouraged by both France and England, as well as by the United States. The number of settlers, in consequence, greatly increased.

It was during this period, in November, 1841, that John Bidwell arrived from Missouri, overland, and entered the service of General Sutter, but soon after located on the land he now owns, near Chico, Butte county, about forty miles from Marysville. Mr. Bidwell is a native of New York State, but emigrated to Missouri, where he was engaged for several years as a school teacher, prior to his starting for California. In company with Mr. Bidwell, overland, were Joseph Childs, Grove Cook, Charles Hoppe, and several others, who at present reside in the State.

As an illustration of the American element in the territory at this time, we refer to an event which occurred on the 19th of October, 1842. Commodore Jones, of the United States navy, having under his command the sloop of war *Cyane*, and frigate *United States*, entered the harbor of Monterey, captured the fort, hoisted the stars and stripes, and declared California a territory of the United States, to the hearty satisfaction of nearly all the inhabitants, a majority of whom were citizens of the United States. The next day, for reasons we shall refer to hereafter, Commodore Jones hauled down his colors and apologized to the Mexican authorities for his conduct. But the impression his action left on the minds of the Mexican and British officers caused them to increase their efforts to prevent the country falling into the hands of the United States, and created an intense feeling of hatred on the part of some of the Mexicans, against the citizens of that country.

As early as May, 1846, Pio Pico, the then Governor of the Territory, who was bitterly opposed to the Americans, in a speech before the Departmental Assembly in favor of annexing California to England, remarked : "We find ourselves threatened by hordes of Yankee emigrants, who have already begun to flock into our country, and whose progress we cannot arrest. Already have the wagons of that perfidious people scaled the almost inaccessible summits of the Sierra Nevada, crossed the entire continent, and penetrated the fruitful valley of the Sacramento. What that astonishing people will next undertake, I cannot say; but in whatever enterprise they embark, they will be sure to be successful. Already, these adventurous voyagers, spreading themselves far and wide over a country which seems to suit their tastes, are cultivating farms, establishing vineyards, erecting mills, sawing up lumber, and doing a thousand other things which seem natural to them."

The settlement of California and Oregon during this period, caused a steady stream of emigrants to wend their way across the plains, many of whom died from the tomahawk of the merciless savage, or from gaunt starvation. It is estimated by those who lived on the great line of this overland travel, that upwards of five thousand persons crossed the plains between the years 1840 and 1845, for the purpose of settling on the Pacific Coast. Several parties of these adventurous emigrants are known to have perished, while the hardships endured by all were of the severest nature.

The passage across the Sierra Nevada mountains in those days was attended with frightful dangers. The sufferings endured by a party under the command of Captain Donner, who were snow-bound near the lake on the Truckee pass, which now bears his name, is one of the most horrible tales of human endurance on record. The party consisted of eighty persons, thirty of whom were females, and several children. Arriving at the foot of the Truckee pass at the end of October, 1846, they were overtaken by a severe snow storm, which rendered it impossible for the cattle to travel. A portion of the party decided not to attempt to cross the mountains until spring. They built themselves cabins, killed the cattle for food, and thought they could hold out till the snow would melt. The balance of the party, under the direction of Mr. Donner, undertook to make the passage, but they had advanced only a few miles when they encountered a series of snow storms, such as are only witnessed in that elevated district. Their cattle and wagons were buried and lost, and the whole party left with but little food, and scarcely any shelter to pass a winter in that wild region. After struggling along for six weeks in the hope of crossing the summit, it was found impossible for all to proceed. A party of eight men, five women, and two Indians, equipped with extemporized snow shoes, and supplied with all the provisions that could be spared, were dispatched to reach some settlement in California where assistance could be obtained. In less than a week after leaving the camp, the provisions of this party were exhausted, while the terrible condition of the country prevented their travelling more than a mile or two each day. On the seventh day, three of the party died from cold and hunger, and a storm of snow buried the survivors so deeply that it took them thirty-six hours, in their wretched condition, to extricate themselves, three more of them perishing in the effort. The nine survivors having been four days without food, the horrible suggestion presented itself of eating the dead bodies of their late companions. After eating the greater portion of one body, the flesh of another was cut off and packed as a supply for the future, and they started on their way once more. In a few days this supply of flesh was consumed, and they were again confronted by starvation, when they fortunately killed a deer, which sustained them for a few days. When this was gone, they became so exhausted from wandering through the loose, drifting snow that, almost daily, death put an end to the sufferings of one, whose body furnished food for the others. In less than a month from leaving camp, only five remained alive ; of these, four were unable to proceed. One, with almost superhuman resolution, managed to drag himself across the summit, and reached a hunter's camp on the Bear River, where he was kindly treated, and his four companions promptly secured from their perilous position. Information of the condition of the party in the mountains was sent to General Sutter, at his fort on the Sacramento, who, at once dispatched a party of men accustomed to mountain life, with a number of mules laden with food and clothing, for their relief. As it was over one hundred miles from the fort to the Truckee, and the travel over the mountains difficult and slow, it was the 19th of February ere the party reached the nearest company of the sufferers. When found, ten of them were beyond all human aid. Not being able to bring along the whole of them, the relief party left a good supply of provisions with the men, and brought away all of the women, and most of the children. A second relief party reached the lake on the 1st of March, and started with the seventeen survivors left by the first party, but a heavy fall of snow rendered it impossible for the mules to carry them. All the adults were, therefore, left in a sheltered place, and only the children were taken to the fort. A few days later another party was sent after those who had been left on the road; when found, three were dead—the survivors had kept themselves alive by eating the bodies. The Donner party was not discovered until April, by a company sent to their relief by citizens of San Francisco. Mrs. Donner, who is represented to have been a lady of refinement and great personal beauty, had been dead but a few hours when the party reached their camp. Donner was one of the first who died. Twenty-two of the females, and most of the children were saved ; twenty-six men, eight women, and three children perished. The people of San Francisco made liberal provision for the son and daughter of Donner, who were rescued. A contribution was raised and the one hundred vara lot No. Thirty-nine, at the southeast corner of Folsom and Second streets was purchased in their name. This lot, at the present time is probably worth $50,000. These children are said to be still living in San Francisco.

One of the female survivors of this fearful tragedy was the first white woman who settled at Marysville—that city being named, as a compliment to her. She subsequently married Mr. Charles Covillaud, one of the founders of Marysville, and resided there until September, 1867, when she died at the early age of thirty-six, leaving a number of children, and greatly beloved by all who had the pleasure of her acquaintance. Hiram O. Miller, another of the survivors, settled in Santa Clara County, where he died in October, 1867.

A few months later, another party of emigrants perished in the mountains, further south, in what, in consequence of their fate, has since been known as Death's valley.

In 1845, the Mormons, having been expelled from their settlements in Illinois, and being informed of the adaptability of California for settlement, and perhaps under the idea that inaccessibility would save them from having many neighbors, made arrangements for a general emigration to the Pacific Coast. In the spring of 1845, a party of nearly two thousand of these people left the Missouri river, for California. Another party, consisting of one hundred and thirty-six men, sixty women, and forty children, under the direction of Mr. Samuel Brannan, left New York on the 4th of February, 1846, on board the *Brooklyn*, for San Francisco, where they arrived July 31st, 1846, just three weeks after Commodore Montgomery had taken possession of the place, in the name of the United States. A company of them went to San Bernardino, to form a settlement there; but Mormonism never took root in California, and, after lingering for a year or two, the settlement was abandoned. Mr. Brannan, on discovering the country in the possession of the United States, sent messengers to the Mormons coming to California overland, to inform them of the condition of affairs here. These messengers met Brigham Young near Great Salt Lake, in Utah, where it was decided to remain, and abandon California. By this fortunate circumstance, the State was spared the evil of polygamy, which has grown so rankly on the soil of Utah. Many of the party who came to San Francisco, concluded to abandon Mormonism, and remain there. Mr. Brannan, after having the honor of being the first person tried in the territory by a jury—on a frivolous charge, of which he was acquitted—became one of the most enterprising and useful citizens in the State.

Another valuable accession to the early settlers was made by the arrival of Colonel Stevenson's regiment of California Volunteers, consisting of nearly one thousand rank and file. In anticipation of movements which were subsequently developed, in 1846, President Polk authorized Colonel J. D. Stevenson to raise a company of Infantry Volunteers, in New York, for the purpose of protecting the interests of the United States on the Pacific Coast. The men comprising this regiment were selected particularly with the object of their becoming settlers in the country; many of them have become permanent and honored citizens of the State. In its ranks, as privates, were sons of senators and representatives in Congress, lawyers, doctors, editors, printers, and representatives of nearly every trade, who were all permitted to bring tools and materials for carrying on their respective occupations—being in striking contrast to the soldiers sent here by the Mexican Government, who were generally the worst convicts from the jails, and such refractory, turbulent characters, as it was most desirable to get rid of.

The California regiment left New York on the 26th of October, 1846, on board the *Thomas H. Perkins*, *Loo Choo*, and *Susan Drew*. The first division, under command of Colonel Stevenson, on board the *Thomas H. Perkins*, arrived at San Francisco March 6th, 1847. The regiment was mustered out of service in the summer of 1848. Nearly three hundred of its members were alive, in California, in July, 1867. Among its commissioned officers were Captain Folsom, Lieutenant Harrison, and Captain Taylor, whose names are connected with streets formed on land they acquired. Captains H. W. Naglee and J. B. Frisbie, hold prominent positions in the history of the State. W. E. Shannon, the delegate from Sacramento to the State constitutional convention, who was the leader of the "free soil" party in that convention, was captain of Company I, of this regiment. The volunteer service of the United States has been honored by the exemplary conduct of the members of Colonel Stevenson's regiment.

The following incident affords an illustration of the kind of mettle these early California volunteers were made of. In the fall of 1846, Major Gillespie's forces, stationed at Los Angeles, were surrounded by a large body of Californians, under command of Andres Pico, and there was no hope of relief, unless assistance could be obtained from Commodore Stockton, who was then on board the *Savannah*, at San Francisco. John Brown, or Juan Flacco, (lean John) one of the little band of beseiged Americans, undertook to carry a despatch to the Commodore. The Mexicans suspected his errand, and in their efforts to capture him shot his horse, but this did not stop him ; he ran twenty-seven miles, to the nearest rancho, where he obtained another horse, and arrived at Santa Barbara the second night after leaving Los Angeles, having been pursued a great portion of the distance by bands of Mexican lancers. By obtaining fresh horses from American settlers, at whose ranchos he called on the way, Brown rode three hundred and fifteen miles, within three days, to Monterey, and reached San Francisco, from Monterey, one hundred and thirty miles, between sunrise and eight o'clock P. M., of the same day. This noted rider died, in Stockton, in 1863.

Mr. Larkin estimated there were two thousand citizens of the United States in California before the close of 1846 ; about three thousand foreigners who were friendly towards Americans ; and about three thousand who were neutral, or opposed to them. The number of British and French had become so important that in May, 1845, Jas. A. Forbes was appointed Consul for England, and Don Luis Gasquet, for France.

In March, 1846, Col. John C. Fremont, on a special mission from the general government, arrived at Monterey, in charge of a party of sixty-two frontiersmen and guides. The results of the attempt on the part of the Mexican authorities to drive this party out of the territory are more directly connected with the early history of the State than with that of the early settlers in the territory. We must, therefore, refer the reader to "Tuthill's History of California," for particulars.

On the 2d of December, 1846, General Kearny, and a force of United States troops, arrived at San Diego, from St. Louis, overland.

Captain Cook, with a battalion of United States cavalry, volunteers, arrived at San Diego in May, 1847, via New Mexico and Sonora. This battalion was soon after disbanded, and the men settled in various localities. Frederick G. E. Tittell, Esq., late Supervisor of the City of San Francisco, and Colonel of the German Regiment, arrived as fifer of this detachment.

January 23d, 1847, a portion of the Third Regiment U. S. Artillery, one hundred and forty-four rank and file, arrived at Monterey, on board the United States storeship *Lexington*. Lieutenant-General W. T. Sherman, the hero of the march through Georgia, came with these troops, as a lieutenant, and Major-General H. W. Halleck as captain of engineers, attached, who was soon afterwards appointed secretary of the territory by General Mason, then military governor. Speaking the Spanish and French languages fluently, General Halleck's knowledge and experience were of great importance in every department of the new government. Traveling all over the country, he soon acquired a knowledge of its resources and capabilities, unsurpassed by any one in it. His services in defense of the Union, during the late rebellion, are recorded in the history of the Republic. Since his return to the State of his adoption, his labors have been incessant in informing himself and the government of the resources and requirements of the Pacific coast. There are few of the early settlers whose services have been as important to the State, as those of Major-General H. W. Halleck.

It not being necessary to the purpose for which this book is intended, to give further details concerning settlers, individually, who arrived since 1846, we conclude this portion of the early history of the territory by stating, that so extensive had become the overland emigration, before the discovery of gold, that a majority of its white population were American citizens, and their families. It is estimated there were twelve thousand white persons in California, in January, 1848, when that discovery was made.

General Mason, who visited the diggings at Coloma, in June, 1848, in his report to the War Department on the subject, estimates there were two thousand Americans and Europeans, and two thousand Indians, at work there; and it is known that there were a great many others washing and prospecting for gold at other localities, at that time.

There are many facts connected with the acquisition of California by the United States, which will probably never be brought to light, till some future Bancroft or Prescott shall be poring over the musty archives of the nation, in search of circumstances to explain the events of its past history. Few of such events will be more difficult of explanation than the fact, that the discovery of gold at Coloma—the event of the age—occurred on the 19th of January, and the treaty by which the country was ceded to the United States, was signed on the 2d of March, 1848, neither of the contracting parties being aware of the great discovery!

Equally difficult will it be to explain how it happened that the Pacific Mail Steamship Company's vessels, the contract for running which, made as early as 1846, required the first to be ready for service in October, 1848, about the time when the news of the gold discovery reached New York, and emigrants were most anxious to get to California as quickly as possible; for it is a remarkable coincidence that the first vessel of that line, the *California*, arrived at San Francisco with the first party of gold-seekers from the Atlantic States, on the last of February, 1849, followed by the *Oregon*, March 31st, and by the *Panama* in the month of June.

Many of the men who have figured most conspicuously in the subsequent history of the State, arrived on board these three steamers, on their first voyage.

By the end of June, 1849, the discovery had become generally known in Europe, China, Australia, the Sandwich Islands, and Central America; and vessels full of eager passengers were constantly arriving from those countries. During that month, nearly two hundred square-rigged vessels lay in the harbor of San Francisco, deserted by officers, crews, and passengers, who had all gone to the mines.

The following is a correct list of the Governors of California, from the date of its settlement by the Spaniards, until it became a State in the American Union:

### UNDER SPANISH RULE.

| | | |
|---|---|---|
| Gasper de Portala | From | 1767 to 1771 |
| Felipe de Barri | " | 1771 to 1774 |
| Felipe de Neve | " | 1774 to 1782 |
| Pedro Fajés | " | 1782 to 1790 |
| José Antonio Romeu | " | 1790 to 1792 |
| José J. de Arrillaga | " | 1792 to 1794 |
| Diego de Borica | " | 1794 to 1800 |
| José J. de Arrillaga | " | 1800 to 1814 |
| José Arguello | " | 1814 to 1815 |
| Pablo Vicente de Sola | " | 1815 to 1822 |

### UNDER MEXICAN RULE.

| | | | | |
|---|---|---|---|---|
| Pablo Vicente de Sola | From | 1822 | to | 1823 |
| Luis Arguello | " | 1823 | to | June, 1825 |
| José Maria de Echeandia | " | June, 1825, | to | Jan'y 1831 |
| Manuel Victoria | " | Jan'y 1831, | to | Jan'y 1832 |
| Pio Pico | " | Jan'y 1832, | to | Jan'y 1833 |
| José Figueroa | " | Jan'y 1833, | to | Aug. 1835 |
| José Castro | " | Aug. 1835, | to | Jan'y 1836 |
| Nicolas Gutierrez | " | Jan'y 1836, | to | April, 1836 |
| Mariano Chico | " | April, 1836, | to | Aug. 1836 |
| Nicolas Gutierrez | " | Aug. 1836, | to | Nov. 1836 |
| Juan B. Alvarado | " | Nov. 1836, | to | Dec. 1842 |
| Manuel Micheltorena | " | Dec. 1842, | to | Feb. 1845 |
| Pio Pico | " | Feb. 1845, | to | July, 1846 |

### AMERICAN TERRITORIAL GOVERNMENT.

The government of California, after it came into possession of the United States, was vested in the commander of the national forces in the country, for the time being. Commodore John D. Sloat, on taking possession of Monterey, July 7th, 1846, issued a proclamation, as Governor of the territory. The Federal and State courts recognize the date of the issuance of this proclamation, as being the date on which the United States obtained possession of the country. Commodore Sloat acted as Governor until August 17th, 1846, when Commodore Robert F. Stockton was proclaimed his successor, who appointed Colonel John C. Fremont, in January, 1847. Fremont was afterwards tried by court-martial, for accepting the office, which belonged to General Stephen W. Kearny, by virtue of his being commander of the forces. General Kearney proclaimed himself governor March 1st, 1847, and afterwards appointed Colonel Richard B. Mason on the 31st of May, 1847, who held office until April 13th, 1849, when General Bennet Riley was appointed military governor.

General Riley, aware that public sentiment was opposed to military rule, on the 3d of June, 1849, issued a proclamation calling a convention, to meet at Monterey on the 1st of September, to frame a State constitution. This convention, consisted of forty-eight members, assembled, pursuant to this proclamation, and organized on the 4th of September, 1849, by electing Dr. Robert Semple president; W. G. Marcy, secretary; Caleb Lyon (afterwards Governor of Idaho) and J. G. Field, assistant secretaries; W. E. P. Hartnell, interpreter, (to translate the proceedings to the native Californian delegates, who did not understand the English language); and J. Ross Browne, the well-known author, as official reporter.

A constitution was adopted and signed by the delegates, on the 13th of October, and submitted to the people for ratification on November, 13th, 1849, when 12,064 votes were polled in favor of its adoption, 811 against it, and 1,200 were set aside for informality. Peter H. Burnett was elected governor, under this constitution, in December, 1849. Being ready to assume the position of a State in the Union, application for admission was made, in due form. After a long and acrimonious struggle in Congress, between the advocates of slavery and free soil, which lasted from December 22d, 1849, until September 7th, 1850, California was admitted as a State on the 9th of September, 1850.

The following are the dates on which the several divisions of the territory were taken possession of by the United States: Monterey, July 7th, 1846; San Francisco, July 9th; Sonoma, July 10th; and Sutter's Fort, July 12th.

## THE COMMERCE OF CALIFORNIA WHILE UNDER THE SPANISH AND MEXICAN RULE.

The commerce of California, while under Spanish and Mexican authority, when compared with what it has become since it has been subject to the dominion of the United States, affords a striking illustration of the predominating traits in the Anglo-Saxon and Spanish characters.

The Spaniards and their descendants, had for three centuries been in possession of the entire Pacific coast, from Valdavia, in latitude 40° south, to the boundary of California, in latitude 42° north, embracing a line of more than five thousand miles of coast, indented with a number of the finest harbors in the world, and bordering a country capable of producing in abundance an almost endless list of articles, for which both Europe and Asia afforded a market, including the most extensive mines of gold and silver then known, with no scarcity of materials or labor for ship-building, or any other purpose; yet they never established a vigorous commerce. Controlling the important trade of the Western Islands, from 1568 to 1815, which obliged them to send their richly laden galleons to the coast of California—a necessity that, as early as 1565, led one of their navigators, Andres de Urdenata, to discover the northwest trade winds, which wafts a vessel from Asia almost to the Golden Gate of California—though following the track of these favoring winds for more than a century, they did not increase their commerce. In the year 1835, there were not more than thirty vessels belonging to all the states and nations of Spanish origin, from Valdavia to Oregon.

Compare this with the career of the United States. Within a century of their existence, they have created a commerce extending over every land and sea, and perfected arrangements for its further extension, unexcelled by those of any other nation. Railroads, steamships, and telegraphs, as appliances of commerce, are more extensively employed by the Anglo-Saxon race in America, than by any other nation; and in no portion of their dominion have these appliances been more effectively employed than in California.

These remarks are not introduced in a spirit of self-laudation, or to express any feeling of disrespect to our Spanish and Mexican fellow-citizens or neighbors, but to account for the extraordinary expansion of the commerce of California, and to explain the basis on which our calculations of its future extension is founded. Within twenty years after obtaining possession of the country by the Anglo-Saxons, this commerce has been expanded from an annual cargo or two of hides and tallow, exported to barter for a few thousand dollars' worth of coarse manufactured goods, until the value of the exports of products and manufactures—exclusive of the precious metals—exceeds $20,000,000, annually, and the imports of merchandise amount to $60,000,000. From a few scows, to transport the hides and tallow from the missions to San Francisco or San Diego, the local marine has increased until there are nearly 1,000 vessels, including 125 steamers, chiefly owned by the merchants of San Francisco; and hundreds of the finest ships of the mercantile marine of the United States are employed in the California trade, which has also created lines of swift and capacious steamers, connecting the State with China, Japan, Europe, the Atlantic States and Australia, *via* the Isthmus of Panama; the Sandwich Islands, British Columbia, Oregon, and Mexico.

These facts and figures prove that less than 500,000 of the Anglo-Saxon race, possessing less than 700 miles of the Pacific coast-line, within less than twenty years, have created a greater commerce than did all the nations of Spanish origin, possessing 5000 miles of that coast, in three hundred years. If such a commerce has been created in so short a time, by so small a population, is it unreasonable to anticipate an immense increase, when the enterprising artizans and manufacturers of the Atlantic States and Europe, being informed of the advantages California offers, as a field for their labor and skill, shall make their homes here, and increase its products and manufactures?

Prior to the arrival of a few citizens of the United States, commerce was unknown in California. The missionaries produced all they required to supply the wants of themselves and their Indian neophytes, and were too much opposed to the introduction of strangers to encourage any communication with the rest of the world.

Mr. Gilroy, who has resided in California since 1814, states that for several years after his arrival, the whole trade and commerce of the country consisted of the shipment of a cargo of tallow, once a year, to Callao, in a Spanish vessel, which in return brought a few cotton goods and miscellaneous articles for the missionaries.

In 1822, after Mexico had declared its independence of Spain, there was a slight increase in the commerce of California. In that year, an English firm at Lima (Peru) established a branch of its business at Monterey, for the purchase of hides and tallow; and vessels from Chili, Peru, and Mexico, made occasional trips for a cargo of these articles. American vessels, trading with the settlers on the Columbia river, finding that the missionaries of California had something to sell, visited San Francisco, Monterey, and San Diego, about this time. Whale ships were quite numerous on the coast, as early as 1820, and occasionally visited the California ports for fresh provisions and water, and bartered for them. It was through the visits of these American vessels that the value of California products became known to the world.

Between 1822 and 1832, the exports from California had increased from a single cargo until they were estimated at 30,000 hides, 7,000 quintals of tallow, 500 bales of furs, and 2,000 bushels of wheat annually. In 1834, this branch of trade was greatly increased by the missionaries killing immense numbers of their cattle, in anticipation of the movement for secularizing the missions, which was already inaugurated by the Mexican Government. In this year, the Fathers slaughtered upwards of 100,000 cattle, to obtain their hides and tallow. At this time a new branch of trade was introduced by Thomas O. Larkin, and other Americans residing at Monterey. Vessels were dispatched with cargoes of horses, cattle, grain, etc., to Honolulu. The first animals of this class ever seen on the Islands, were taken from California, on board the brig *Delia Byrd*, and landed there in June, 1803: they consisted of one horse and two mares. In the course of a year or two, these exports were increased by shipments of lumber, shingles, flour, potatoes, soap, etc. The Hudson Bay Company, also, began to send to California for supplies of grain and provisions, for its establishment on the Columbia, and the missionaries began to produce wine, raisins, olives, etc., which found a ready market in Mexico.

From 1825 to 1836, an important element in the trade of California consisted of the skins of the sea otter, which were exceedingly abundant on the coast from Mazatlan to San Francisco. But their reckless slaughter by the hunters exterminated them before 1840. La Pérouse states that when he visited Monterey, in 1786, the agents of the Spanish Government, who then controlled this trade, were collecting the skins. Twenty thousand otters were in the list. The great French navigator thought they might have collected fifty thousand, the animals were so very numerous.

As the export trade increased, the value and variety of the imports began to increase also, and about the year 1830, they included clothing, furniture, agricultural implements, salt, candles, lumber, etc.

There was no trade with the interior of the country until about 1840. The few inhabitants who resided beyond the boundaries of the missions had to produce all they required, or barter with the missionaries for cloth, wine, etc. There was no circulating medium of any kind in the country until 1824, when the "hide ships," introduced a few hundred dollars worth of silver, which generally found its way into the coffers of the missionaries. In 1832 there was but little money in circulation, most of the trade being transacted by barter. As late as 1848, up to the discovery of gold, the currency of the country was almost exclusively silver. When La Pérouse visited the country, in 1798, beads were the circulating medium.

The trade of California steadily increased under the judicious cultivation of the American residents. English, Chilian, and Mexican merchants sent their ships here to compete for a share of this trade. The following table of imports and exports, compiled by De Mofras, in 1841, show that the Bostonians, who at that time managed this trade, obtained the largest share of it:

*Imports and Exports of California, in* 1841.

| Nation. | Exports. | Imports. |
|---|---|---|
| United States | $70,000 | $150,000 |
| Mexican | 50,000 | 65,000 |
| English | 20,000 | 45,000 |
| Other countries | 10,000 | 20,000 |
| Totals | $150,000 | $280,000 |

Included in these exports were hides valued at $210,000 ; tallow, $55,000; peltries, lumber, etc., $15,000. About thirty vessels visited California, annually, in the conduct of this business.

From 1837 to 1841, the trade of San Francisco was almost exclusively in the hands of the Hudson Bay Company. In 1841, this company sold out its establishment and left the country. San Diego was then the seat of the export and import trade, but San Francisco began to take the lead in 1842. From 1841 to 1846, the commerce of California greatly increased. The preparations made by the United States Government to take possession of the territory caused an extensive circulation of money. The arrival of large detachments of its naval and military forces, and the great increase in the number of inhabitants by immigration, both by sea and overland, created a considerable inland trade. The imports and exports were also materially increased.

The following table of exports and imports, at San Francisco, during October, November, and December, 1847, will convey an idea of the course of the trade at that time :

*Imports and Exports at San Francisco during the last Quarter of* 1847.

| Countries. | Exports. | Imports. |
|---|---|---|
| Atlantic States | $2,060 00 | $6,790 54 |
| Oregon | | 7,701 59 |
| Mexico | 5,391 50 | 160 00 |
| Sandwich Islands | 1,422 18 | 31,740 00 |
| Chili and Peru | 21,448 35 | 3,676 44 |
| Sitka | | 2,471 32 |
| Bremen | | 550 54 |
| Other countries | 19,275 50 | 499 10 |
| Totals | $49,597 53 | $53,589 53 |

The discovery of gold on the 19th of January, 1848, so thoroughly revolutionized the commerce, and everything else in the country, that a new era was inaugurated. As all the particulars of that event, and the history of San Francisco, which became the metropolis of the Pacific Coast in consequence of that discovery, are each given in a separate chapter, the commerce of the country subsequent to that event will be found in those chapters.

## THE ACQUISITION OF CALIFORNIA BY THE UNITED STATES.

As there are many persons in California, as well as in the Atlantic States and Europe, who labor under the impression that the acquisition of this State was influenced by, or was in some manner connected with the discovery of gold, the following synopsis of the policy pursued by the United States Government in acquiring territory on the Pacific Coast may be useful in removing such an erroneous impression, and in proving that that grand discovery was the result of American enterprise subsequent to the possession of the country by the Federal Government.

We have already stated, when explaining the causes which led to the establishment of the first settlement of Americans on the Pacific Coast, that the importance of the fur trade of the northwest territory, as early as 1784, induced Mr. Jefferson, while Minister to France, to employ John Ledyard, to make an exploration of a portion of that territory, with a view to its ultimate possession and settlement by the United States—a purpose so well understood by the Russian Government that Ledyard was arrested and expelled from the country. This did not prevent Mr. Jefferson and his friends from persisting in their efforts to obtain their end. Through their influence, Mr. Astor, the great American fur merchant, was induced to fit out several vessels, ostensibly to trade, but really to found a settlement on this coast. One of these vessels discovered the Columbia River, and another founded a trading post on its banks, claiming the land by virtue of its discovery. This claim was denied by both Russia and England, which were most anxious to prevent an American settlement on this coast. This settlement was the entrance of the wedge of American possession on this coast, which has yet to be driven home. On the 30th of April, 1803, the United States purchased the territory of Louisiana from France, which gave it another foothold on the Pacific. It was stated in the title conveyed by this purchase that the western boundary of that territory was the Pacific Ocean. Spain, England, and Russia, objected to such boundary. Pending a settlement of the dispute which arose on this point, Mr. Jefferson, who was then President, to carry out the object for which he had employed Ledyard, nearly twenty years previously, appointed Clark and Lewis, two famous explorers, whose names are familiar to every reader of American history, and several other parties, to make a thorough exploration of the country, "from the Missouri to the Colorado, Oregon, and Columbia, to find the most direct and practicable communication across the continent, for the purposes of commerce."

The expedition of Clark and Lewis left the Missouri on the 7th of April, 1805, and reached the mouth of the Columbia, on the Pacific, on the 15th of the following November. The report of this expedition, the remarks of Mr. Jefferson, and the action of Congress in relation thereto, were accepted by England, Russia, France, and Spain, as a notification that the United States intended to establish settlements in the newly acquired territory on the Pacific, and caused considerable opposition to be manifested by each of these nations. They all denied the title of the United States to any portion of the Pacific Coast, rejecting the claim based on the Louisiana purchase, on the ground that France did not possess any territory on that coast, consequently could not convey any to any other power.

In order to anticipate the proposed settlement by the United States. England fitted out an expedition to take possession of the country, and in 1808, founded a settlement near Frazer's Lake, a tributary of the Columbia. This was the first settlement of the British west of the Rocky Mountains.

The Russians, equally anxious to prevent an American settlement on the Columbia, sought to attain their ends by strategy. In 1808, Count Romanzoff, the Russian Minister of Foreign Affairs, proposed to John Quincy Adams, who was then Minister to that country, to give American ships the privilege of supplying the Russian settlements on the Pacific Coast with provisions and manufactured goods, and of transporting the Russian American Fur Company's furs to China, (a most valuable trade,) provided the United States government would recognize Russia's asserted right to the Pacific Coast, south of the Columbia river.

The United States rejected the proposition, and insisted on its title to the territory south of that river, by both discovery and purchase. In 1811, the settlement of Astoria was founded, under the most favorable auspices, and was progressing equal to the expectations of its projectors, until the commencement of the war between the United States and England, in 1812, when the destruction of that settlement appears to have been sought with extraordinary zeal. It was captured by the English on the 13th of October, 1813. After the conclusion of the war, strenuous efforts were made by England to retain Astoria. The dispute for its possession was not settled for nearly twenty-five years—

the Federal Government, never relaxing its hold of the territory thus fairly acquired, and necessary for the extension of American interests on the Pacific Coast. So important had this place and Oregon, which sprang from it, become, in 1845, that it was for the purpose of making communication between them and Panama that the Pacific Mail Steamship Company was projected.

In 1818, Don Luis de Onis, the Spanish Minister, prompted by the French Government, set up a claim to the territory on the Pacific Coast purchased by the United States from France. After many delays and much diplomacy, this claim was settled by the Florida treaty of February 22, 1819, by which Spain ceded to the United States all the territory west of the River Sabine, and south of the upper parts of the Red and Arkansas rivers, from a line drawn from the source of the Arkansas, on the forty-second parallel of latitude, to the Pacific Coast.

In 1823, President Monroe, in a message to Congress, explained to the world what the policy of the United States on the Pacific Coast would be thereafter, in reference to colonization, in his memorable assertion of the Monroe doctrine, "that the American continents, by the free and independent condition they have assumed and maintained, are henceforth not to be considered subjects for colonization by any European power." This declaration caused the crowned heads of Europe to protest against a doctrine—the recent disaster to France by the overthrow of Maximilian, the purchase and conquest of California from Mexico, and the peaceful acquisition of the Russian possessions on this coast prove—that the people of the United States intend to maintain, peaceably if they can, forcibly if they must.

As an illustration of how strongly impressed were the intelligent minds of the nation in favor of this doctrine, and with the belief that the Pacific Coast would, at no distant day, form the western boundary of the Union, many years before the acquisition of California, we refer to an oration delivered November 3d, 1835, when the first spadeful of earth was dug towards constructing the New York and Erie railroad. The event was one of great ceremony and much national importance. The orator, on that occasion, in the course of his remarks, stated "that some of his hearers would live to see a continuous line of railroads from the bay of New York to the shores of the Pacific." Who then thought so bold an assertion would so soon be realized? This sagacious speaker merely gave expression to the policy of the United States, which has been but partially carried out.

The enunciation of the Monroe doctrine caused France and England, who were deeply interested in the Pacific coast to use every means to prevent any extension of the United States territory there. In 1841, Marshal Soult, Minister of War under Louis Phillipe, appointed M. Duflot de Mofras, an eminent French savant and diplomat, to make a thorough exploration of California, and to prepare the way for France to acquire possession of the country. It is known that secret agents of that government resided in California from the time of M. De Mofras' visit, until it fell into the hands of the United States. The Federal government, aware of the purposes of France, dispatched Commodore Wilkes, with a squadron, consisting of five vessels of war, which remained at San Francisco for several months, on a precisely similar expedition, during which time that officer thoroughly surveyed the bay of San Francisco, and the Sacramento River, as far as Sutter's Fort. England, suspecting the designs of both, also dispatched a naval squadron for the same purpose. It must have been an interesting sight to the few residents of San Francisco at that time, to have seen the ships of three such powerful nations riding at anchor in their bay. Had they known that they were all there for a similar object, the interest of their visit would probably have been much enhanced.

M. de Mofras, in page 68, vol. ii, of his report states that he was satisfied, from information he gathered on board the English and United States vessels, that both parties expected to obtain possession of the country; while his own book was written to instruct the French officers how best to accomplish the same object.

The foregoing facts are deemed sufficient to prove that the United States, for nearly half a century prior to the acquisition of California, or the discovery of gold, had been unremitting in their efforts to extend their dominion on the Pacific Coast. The territory they now own proves that these efforts have been crowned with signal success, despite the opposition of France, England, Spain, and Russia. From the small settlement on the Columbia, in 1810, when the wedge of possession was entered, the national boundaries on the Pacific Coast have been expanded, until they embrace California, containing 158,987 square miles; Oregon, 95,248 square miles; Washington, 69,994 square miles; Nevada, 108,000 square miles; Arizona, 118,000 square miles; New Mexico, 121,201 square miles; Utah, 88,000 square miles; Colorado, 104,500 square miles; Idaho, 105,000 square miles; Montana, 145,000 square miles; and Alaska, 570,000 square miles; a total of 1,683,930 square miles—a territory nearly twice as large as all the kingdoms of Europe (except Russia) combined. The States and territories along the coast alone (including Alaska) comprise an area of 894,229 square miles, which is larger than all the New England, Middle, and Western

States, and nearly equal to France, Great Britain, Germany, Prussia, and Austria, combined. These nations contain nearly one hundred and sixty millions of inhabitants, and the whole Pacific States and Territories have less than one million, while there is no country richer in natural wealth than a large portion of the Pacific Coast.

The condition of California, for many years before its conquest and purchase by the United States, was such as to offer inducements for its seizure by any power having real or fancied grievances against the Mexican government. Its great agricultural capabilities, and the importance of its geographical position for political and commercial purposes, were as well understood by France and England as they were by the United States, and each of these powers were plotting for its possession.

The tenure by which Mexico held dominion over the territory thus coveted by the three greatest nations, was the most frail. The majority of the more intelligent native Californians, were not in sympathy with their rulers. There was no trade, and but infrequent and irregular communication between the two countries, which also differed in soil, climate, and productions. The policy followed by Mexico, for many years, of sending its convicts and outlaws to California, to save the cost of keeping them in the jails, was not calculated to engender either respect or confidence. The influx of Americans, the energy, enterprise and prosperity they introduced, and the interest the United States Government exhibited in behalf of its citizens on all occasions, under such circumstances, were well adapted to impress the Californians in favor of the United States, and to induce them to desire to attach their country to such a power. The secret agents of France and England had not failed to observe this feeling among the inhabitants, and had informed their Governments of its probable effects.

The Federal Government, aware of all the plans of both France and England for the acquisition of the territory, and knowing that the only effective means to prevent one or the other accomplishing that object was to obtain possession itself—endeavored to purchase the territory from Mexico. As early as 1835, President Jackson proposed to purchase that portion of it "lying east and north of lines drawn from the Gulf of Mexico, along the eastern branch of the Rio Bravo del Norte, up to the 37th parallel of north latitude, and along that parallel to the Pacific Ocean." This purchase would have been effected, but for the interference of the British Government.

In 1845, John Slidell was appointed minister to Mexico, with special instructions relating to the purchase of California, which would have been accomplished but for British interference. After these repeated failures to obtain possession by purchase, and having full knowledge of the plans of England to obtain the prize, the struggle for mastery between the Federal Government and England became close and interesting. The Californians, prompted by the American residents in the territory, in 1846, declared themselves independent of Mexico. The majority of these were strongly in favor of annexation to the United States; but the influence of Mr. Forbes, the British consul, had raised a dangerous opposition, at the head of which stood Governor Pico, General Castro, and several other prominent natives. Fortunately, the well matured plans of the Federal Government settled the question. Fremont, on his arrival here, on an exploring expedition, was met by Lieutenant Gillespie with oral instructions to take possession of the country, and keep it until reinforcements on the way could reach him. These reinforcements came in the very nick of time, and the conquest was accomplished.

To show how close was the contest between the United States and England, it may be stated that within twenty-four hours after Commodore Sloat had taken possession of Monterey, the English admiral, Sir George Seymour, arrived there on board the *Collingwood*. The blunt old sailor good-naturedly informed Sloat that he had come to take possession of the country, in the name of his government.

Mr. Colton, chaplain in the U. S. navy, who was acting as alcalde at Monterey at this time, states that there was an excited meeting at that place, on the 9th of July, two days after the capture of the town by Commodore Sloat, for the purpose of calling on the British admiral, who was then in the port, for protection, and placing the territory under that flag.

In April, 1846, Mr. Forbes, the British consul, had completed arrangements with Governor Pico and General Castro, for placing California in possession of England, on the condition that England would assume the debt of $50,000,000, due by Mexico to British subjects. To retain possession, England was to send out a colony of Irishmen, under the direction of a catholic priest named Macnamara, who was an agent of that government. The deeds for three thousand square leagues of land in the San Joaquin and Sacramento valleys, made in favor of this Macnamara, very fortunately fell into the hands of the Federal Government, before they were signed by Governor Pico, or there might have been a tremendous claim for compensation, by this individual. To show how thoroughly informed the Federal Government were of this design, we quote the following instructions from Secretary Bancroft to Commodore Sloat, under date of July 12th, 1846, only two months after Forbes' contract had been signed :

> "The object of the United States has reference to ultimate peace with Mexico; and if at that peace the basis of the *uti possiditis* shall be established, the government expects, through your forces, to be found in actual possession of Upper California. * * * After you shall have secured Upper California, if your force is sufficient, you will take possession and keep the harbors in the Gulf of California, as far down, at least, as Guaymas. But this is not to interfere with the permanent occupation of Upper California."

This document clearly establishes the fact, that the acquisition of California was determined upon by the Federal Government, nearly two years before the discovery of gold, and was rendered imperative by the intrigues of the English Government, to prevent the United States extending their influence on the Pacific coast.

Those who desire further information concerning the early history of California and the Pacific Coast, will find much interesting data in the voyages of Drake, La Pérouse, Vancouver, Beechey, and Perry ; in the writings of Fathers Venegas and Palou, and in the works of Forbes, De Mofras, Greenhow, and Tuthill.

# CHAPTER II.

## GEOGRAPHY AND TOPOGRAPHY.

Outline of Geography—The Harbors of California—San Francisco Bay—Tidal Influences—San Diego Harbor—San Pedro Bay—The Santa Barbara Channel—San Luis Obispo Bay—Monterey Bay—Santa Cruz Harbor—Half Moon Bay—Drake's Bay—Tomales Bay—Bodega Bay—Humboldt Bay—Trinidad Bay—Crescent City Harbor—Improvements to be Made—Islands on the Coast.

California is an extremely rugged country, a large portion of its surface being covered with hills and mountains. As much of its territory remains unsurveyed, and has been but partially explored, the details of its geography and topography are unavoidably incomplete. But sufficient is known of both to enable us to describe its general outline, as well as many of its most conspicuous and interesting features.

In outline California forms an irregular parallelogram, its length averaging about seven hundred miles, extending southeast by northwest, from latitude 32°45′ to latitude 42°, with an average breadth of nearly two hundred miles. It contains 158,687 square miles, or more than 100,000,000 statute acres, of which 35,000,000 acres are adapted for agricultural purposes; 23,000,000 acres for grazing; 5,000,000 acres are swamp and overflowed lands, which may be reclaimed. The lakes, rivers, bays, and other surface covered with permanent water, amount to nearly 4,000,000 acres; about 10,000,000 acres consist of arid plains and deserts, the balance, 23,000,000 acres being covered with rugged, and for the most part heavily timbered mountains.

Its mountains, which comprise the predominating geographical and topographical features, for the convenience of description, may be classed under two grand divisions: the Sierra Nevada ranges, which traverse the State along its eastern border, and the Coast Range, which, as its name implies, extends along its western border near the sea coast. These divisions, uniting on the south, near Fort Tejon, latitude 35°, and on the north, near Shasta City, latitude 40°35′, enclose the valleys of the Sacramento and San Joaquin, which are nearly three hundred and fifty miles in length, and from forty to eighty miles wide at the points of their greatest divergence.

Each of these divisions embraces many separate groups of mountain chains of vast extent, differing in geological relations and mineral composition, presenting in many places scenes of rare beauty, or rugged wildness not surpassed by any mountains in the world ; for here, the mighty forces of the volcano and earthquake, of the crushing, slow-moving, ponderous glacier, and of the swift-destroying flood, have each left evidence of their power.

When we state that the Coast Range and Sierra Nevada mountains, after separating as above mentioned, diverge from both points of contact with a tolerably even curve, until the divergence reaches its greatest limit, the reader may form some idea of the shape of the magnificent valleys they enclose, which contain nearly five eighths of all the level land in the State. It is this peculiarity of their form which renders a great portion of them subject to overflow during rainy seasons. The whole of the water which flows from nearly five hundred miles of the Sierra Nevada ranges, and from the eastern slope of the coast mountains, must find its way to the ocean through these valleys—the Sacramento flowing from the north, the San Joaquin from the south—giving names to the portions through which they pass, bring the accumulated waters to the head of Suisun Bay, where they unite. The only outlet for this bay, the Straits of Carquinez—a narrow channel, several miles in length and less than a mile in width—being too small for the passage of the waters as rapidly as they accumulate from such an extent of mountainous country, during extraordinarily wet seasons, they rise, and as the greater portion of the land of the valleys is but a few feet above the ordinary water level, they are speedily submerged, except where protected by levees.

It is much more difficult to convey an idea of the form and extent of the mountains within the State, by a mere description, than it is of its great valleys. Their stupendous proportions and complex structure are so entirely unparalleled that there are few points of comparison between them and other mountains to which we can refer the reader to assist in illustrating our description. The Sierra Nevada, or snowy mountains, which bound the Sacramento valley on the east, include a series of ranges, which, collectively, are seventy miles wide. The general name for the group is derived from the snow which is rarely absent from the higher peaks in the range.

The Coast Range, which bounds it on the west, also consists of a series of chains aggregating forty miles miles in width, bordering the State from its northern to its southern boundary. There is a most remarkable difference in the structure and conformation of the two series. The Sierra Nevada ranges may be traced in consecutive order for an immense distance. The whole country, for nearly five hundred miles in length, and nearly one hundred miles in width—their extent within the limits of the State—being subordinate in configuration to two lines of culminating crests, which impart a peculiar character to its topography, while in the Coast Range all is confusion and disorder. Each mountain in the whole series appears to be the product of causes singularly local in their effects—the mineral composition of many high mountains, in close proximity to each other, being very different. There are peaks in this range which reach from fifteen hundred to eight thousand feet above the sea level, but there is no connection in the direction of such culminating peaks.

If we compare this peculiarly local structure of the Coast Range with the remarkable continuity in the direction of the Sierra Nevada ranges, we may comprehend some of the peculiarities which form the most interesting features in the two series of California mountains—its Alps and Appalachians. The highest peaks of the Sierra Nevada, from Mount Shasta on the north, including Lassen's Butte, Spanish Peak, Pilot Peak, the Downieville Buttes, Pyramid Peak, Castle Peak, Mounts Dana, Lyell, Brewer, Tyndall, Whitney, and several others not yet named, which reach from 10,000 to 15,000 feet above the level of the sea, are nearly all in a line running N. 31° W. On the eastern side of this culminating line of peaks is situated a series of lakes, the principal of which are the Klamath, Pyramid, Mono, and Owens', lying wholly to the east of the Sierra, and Tahoe, occupying an elevated valley at a point where the range separates into two summits. The confluence of the Gila and Colorado rivers forms the southern limit of the depression in which these lakes are located. A somewhat similar depression exists on the western slope of this ridge of high peaks, which is also about fifty miles wide, and terminated by another series of peaks, remarkably continuous in their direction, and also containing a series of lakes. This remarkable continuity in the main features of the topography of so large a portion of the State, has induced geographers to divide it into four sections, which differ from each other in soil, climate, and productions. That section which lies to the east of the range of culminating peaks, is generally termed the "Eastern Slope." The depression on the west of this range, and the subordinate range of peaks which bound this depression on the west, is considered as the

Sierra proper. The depression between the foot hills of this subordinate range and the Coast Range, is called the California valley—the Coast Range forming a separate section. The State is further divided, geographically, by a line drawn from west to east, in the locality of Fort Tejon ; all south of such line is considered southern California; all the territory north of another line, intersecting Trinity, Humboldt, Tehama, and Plumas counties, being considered as northern California ; the country between these two lines being central California. This central division contains seven eighths of the population and wealth of the State.

From Point Concepcion, in latitude 34°20′, to Cape Mendocino, in latitude 40°20′, the mountains of the Coast Range present a rocky barrier, with numerous projecting headlands, against which the waves of the Pacific Ocean break with great fury during the prevalence of easterly or westerly gales. Between these two points, and sheltered by these projecting headlands, the mariner finds the best harbors along the coast. Coming from the north, and sailing south, he meets with Bodega bay, in Sonoma county; Tomales, and Drake's bay, in Marin county; San Francisco bay; Half Moon bay, in San Mateo county; Santa Cruz bay, Santa Cruz county; Monterey, and Carmel bays, in Monterey county; Estero, and San Luis bays, in San Luis Obispo county. North of Cape Mendocino is Humboldt bay, in Humboldt county; Trinidad bay, in Klamath county; Light and Pelican bays, in Del Norte county. South of Point Concepcion there are sandy plains, twenty to forty miles wide, between the mountains and the sea. Along these flat shores are the harbors of Santa Barbara, in Santa Barbara county ; Wilmington and Anaheim Landing, in Los Angeles county; San Luis Rey, and San Diego, in San Diego county.

It will be perceived by this list of harbors along the coast of California, that it possesses great facilities for carrying on an extensive coasting trade. In addition to the harbors above named there are several estuaries and rivers indenting the coast, which afford convenient anchorage for vessels to load lumber, grain, firewood, and other products of the coast range.

Those portions of this range which skirt the coast in Marin, Sonoma, and Mendocino counties, between latitude 38° and 40°, are tolerably well timbered; but south of Bodega bay, and north of Mendocino county, except about Monterey bay and Santa Cruz, the coast line presents a bleak and sterile appearance. All the valleys in the range, which are open to the coast, are narrow and trend nearly east and west. The Salinas, the most extensive of these coast valleys, is nearly ninety miles in length by eight to fourteen miles in width, a large portion of which is adapted to agricultural purposes—being exceedingly fertile, producing abundance of wild oats and clover, where not under cultivation. The Russian river valley, which also opens to the sea, is also very fertile. Further inland, sheltered from the cool sea breezes by the outer range of mountains, are many tolerably broad and very beautiful valleys, which produce the finest grain, fruit, and vegetables raised on this part of the coast.

Among these inland valleys of the Coast Range are Sonoma, Napa, and Petaluma, having navigable rivers connecting them with the bay of San Francisco; Berreyesa, Suisun, Vaca, Clear Lake (the Switzerland of California), Amador, San Ramon, Santa Clara, Pajaro, and many others, which will be referred to more particularly when describing the topography of the counties in which they are located.

The outer coast valleys are generally separated by steep, barren ridges, while those inland are divided by gently sloping hills, somewhat similar to the rolling prairie lands of Illinois, and are susceptible of cultivation over their entire surface. All the coast valleys are tolerably well watered.

The most familiar and thoroughly explored division of the coast mountains, is the Monte Diablo range, which covers a territory about one hundred and fifty miles long and from twenty to thirty miles wide. This division possesses much importance, from its containing the only coal-mines in the State now profitably worked. It is bounded on the south by Los Gatos creek, on the east by the valley of the San Joaquin, on the west by the bay of San Francisco and the Santa Clara valley, and on the north by the straits of Carquinez and San Pablo bay. The portion of this range which forms so picturesque a background to the landscape, as seen from San Francisco, across the bay, are the Contra Costa hills. These hills being in front of Monte Diablo, from that point of view, only its crest is seen above them; but it forms a conspicuous object in the scene from all other points, and is one of the best known landmarks in the State, although it is not so high as many other mountains in the Coast Range. Mount San Bernardino, in San Bernardino county, is 8500 feet high; Mount Hamilton, 4440 feet; Mount Ripley, in Lake county, 7500 feet; San Carlos peak, in Fresno county, 4977 feet; Mount Downey, in Los Angeles county, 5675 feet; Monte Diablo being 3881 feet. There are nearly twenty unnamed peaks along the coast, reaching from 4000 to 5000 feet in height.

Owing to the peculiarly isolated position of Monte Diablo—standing aloof, as it does, from the throng of peaks that rise from the Coast Range, like a patrician separated from plebeians, the beauty of its outline commands the attention of the traveler by land or sea—makes it a landmark not possible to mistake, and causes its summit to be a center from whence may be viewed a wider range of country than can be seen from almost any other point in the State. On the north, east and southeast, may be seen a large portion of the great valleys of the Sacramento and San Joaquin, with many thriving towns and villages, environed with gardens and farms, while sweeps and slopes of verdure mark the distant plains with hues inimitable by art. In the extreme distance, as a border to this grand panorama, rising range above range, is seen the Sierra Nevada mountains, stretching along the horizon upwards of three hundred miles. In an opposite direction the beautiful valleys of the Coast Range come into view, with all the charming features of prosperous and skilled rural industry, and the broad bay of San Francisco, where are riding at anchor a fleet of ships, from the masts of which the ensigns of nearly all nations may be seen fluttering; while beyond, extending from the water-line to the very summit of the highest hills, is San Francisco city, the home of nearly one fourth of the population of the State. To the right is seen the forts and earthworks that guard the Golden Gate, while beyond, as far as the eye can reach, is the Pacific ocean, bearing on its bosom numberless vessels, passing to or fro on the peaceful mission of commerce.

The aborigines called this great landmark of California, *Kah Woo Koom*—the mighty mountain. The Spaniards called it *Sierra de los Gorgones*, either of which is preferable to its present name, which really does not belong to it, but to a small hill seven miles to the north, to which the name was applied from the following incident: About the year 1814, a party of Spanish soldiers were sent from the presidio of San Francisco to chastise the tribe of Indians who roamed through this portion of the Coast Range. In a fight that took place, three of the Spaniards were killed, the others "retired in good order" to the little hill, as a place where they could defend themselves against the swarm of Indians. At night, the sentry, half asleep at his post, fancied he saw a spectral figure, of colossal proportions, flying through the air towards the hill where his comrades lay sleeping. Terrified by the apparition, he cried out, "El Diablo! El Diablo!" The Spaniards, being more afraid of the devil than they were of the Indians, fled from the spot, which was thereafter known as Monte Diablo. As there was a good spring of water in the vicinity, it was often resorted to by hunters, who, in describing it to their friends, called it the Monte Diablo spring. In after years, settlers began to make their homes near Monte Diablo, and when the great influx came in 1848 and 1849, the name was transferred from the little hill to the large mountain, and has since been applied to the whole range.

There is but one river in the whole coast range of California connecting with the ocean that is navigable—the Salinas, in Monterey county. There is quite a number which connect with San Francisco, San Pablo and Suisun bays, from the interior, and are consequently of nearly equal importance for purposes of trade and commerce, as if they connected with the ocean. The Suisun, Napa, Sonoma, and Petaluma, all enter on the north of San Pablo bay, and are navigable by steamers. North of the Golden Gate, are Russian river, in Sonoma county; Mad and Eel rivers, in Humboldt county; and the Smith and Klamath, in Del Norte county—all of which are permanent streams of considerable magnitude, but have too many impediments, and too great a fall, to be navigable. The Eel has been cleared within the past few months, as it is proposed to run a steamer up it for a few miles. On the south are the Pajaro, in Santa Cruz and Monterey counties; the Santa Inez and Santa Clara, in Santa Barbara county; the Santa Maria, in San Luis Obispo county; the Santa Ana and San Gabriel, in Los Angeles county; and a number of others; but as the latter are little better than channels for carrying off the superfluous rain during the wet season, being dry at nearly all other seasons, they are not of sufficient importance to deserve further mention in this place.

## THE HARBORS OF CALIFORNIA.

### SAN FRANCISCO HARBOR.

This, the safest, best, and most capacious harbor on the western coast of North America, is a securely land-locked bay, nearly fifty miles in length, by an average of about nine miles in width, with deep water, good anchorage, and well sheltered by the surrounding hills from the violence of the winds, from every point of the compass. The entrance to this bay, which none of the early navigators were able to discover, is in latitude 37° 48′ north, and longitude 122° 30′ west from Greenwich, is through a strait about five miles in length and a mile wide, which was most appropriately named Chrysopalæ—the Golden Gate—by Fremont, in his "Geographical Memoir of California," written in 1847, before the source of the golden streams which have since flowed through it, was discovered.

As all the waters from the interior flow through this opening to the sea, there is a considerable outward current, at ebb tide, which runs at the rate of six miles an hour, at ordinary seasons, and with much greater force during seasons of flood; but such are the admirable arrangements made by Nature, in completing her work at this point, that this current offers no impediment to vessels coming in, there never being less than thirty feet of water on any part of the entrance. The shores of this strait are bold and rocky, rising on the north side, in some places to nearly two thousand feet in height, bare and bleak. On the south, many of the hills, which are from three hundred to four hundred feet high, are covered with nearly white sands, which are shifted by every breeze. While on the outside of this entrance, all is drear and gloomy—nothing to be seen but barren rocks and sandy dunes, rendered additionally dismal by the fogs which prevail a greater portion of the year, during the early part of each day, once through the narrow opening, the scene changes as by magic. Passing through the strait, which trends at right angles to the bay, as its end is reached, a striking contrast is presented: the fog is left behind, the gently sloping hills, on the north of the lower bay, are either emerald green, in the spring, or russet brown with the remains of the summer's verdure, in the fall. In front, in the middle of the channel, and only about four miles from the entrance, is Fort Alcatraz, bristling with heavy ordinance, and crowned with a tall light-house. To the right, and still nearer to the "Gate," on a projecting spur of rocks, which appears to have been placed there for that express purpose, stands the red brick buildings of Fort Point, surrounded by a labyrinth of solid granite fortifications. Beyond, on the south, appears a forest of masts of vessels anchored in the stream, or moored to the wharves, which extend along the entire city front. On the right, spread over miles of deeply cut hills, and artificially made levels, which extend far into the waters of the bay, lies the city of San Francisco. On the opposite shore is Oakland and Alameda, peeping through groves of live oak, while, around in all directions, is seen the gently undulating country which forms the garden of the State, its hills rising tier above tier, each of different tint, as "distance lends enchantment to the view."

The beauties of the bay of San Francisco are not, however, of that soft, voluptuous, enervating type, which poets and travelers ascribe to the famous bay of Naples; they are of a sturdier, hardier, more active and animated character—as much in conformity with the spirit of the people who dwell along its borders, as the warm, rippleless waters of the Neapolitan bay are in consonance with its lazzaroni.

There are a number of islands and harbors within San Francisco and connecting bays, of considerable importance.

Alcatraz island, near the entrance of the Golden Gate, is about 1,600 feet in length by 450 feet in width, containing about thirty-five acres. Its highest point is 135 feet above the waters of the bay. It is the key to the fortifications of the harbor.

Angel island is the largest in San Francisco bay. It contains upwards of eight hundred acres of good land, with an abundant supply of fresh water. It was formerly well timbered with oak, when it formed an interesting object in the landscape, as seen from the city of San Francisco, four miles distant. It contains few trees now, but produces good crops of wheat and barley. There are upon it quarries of excellent building stone. Most of the rock used in constructing the fortifications on Alcatraz, and at Fort Point, was obtained at these quarries; the stone used in the erection of the Bank of California, one of the handsomest structures on the coast, was also obtained here.

Yerba Buena, or Goat island, lies directly opposite San Francisco. It is much smaller than Angel island.

Molate island, or Red Rock, about four miles north of Angel island, is a barren rock, of some little importance, as it contains a vein of manganese ore, of which several shipments have been made to England.

Bird Rock, and the Two Sisters, are unimportant but picturesque rocks, near the northern end of San Francisco bay.

There are several other rocks and islands around the shores of this bay, which are not of sufficient importance to be noticed in this place.

At the head of San Pablo bay stands Napa or Mare island, on which the United States navy-yard is located, forming one side of the straits and bay of Napa, which connects with Napa creek, a stream from the Suscol mountains.

Vallejo—a rapidly improving town, once the capital of the State—is located on the east side of Napa Bay, and opposite the navy-yard on Mare island. There is good anchorage and shelter, and plenty of water for the largest vessels in this bay. The Vallejo and Sacramento railroad, connecting with the Central Pacific, the Folsom and Placerville, and the Northern or Marysville railroads, has its terminus here, bringing the Pacific railroad within thirty miles of San Francisco. At the eastern entrance of the Straits of Carquinez, which have a length of seven miles, are situated the towns of Benicia and Martinez. They occupy sites opposite each other—the straits here being about four miles wide. A steam ferry boat runs between them. The various towns and harbors further inland are referred to elsewhere.

With such facilities for foreign and domestic trade, as the harbor of San Francisco affords to that city, there is nothing remarkable in the fact that three-fourths of the capital, and nearly one-fourth of the population of the State, are concentrated there.

*Tidal Influences.*—The tidal influences on the rivers emptying into the bay of San Francisco, extend to the head of navigation in the interior. The maximum rise of full tide at San Francisco, is 8 feet two inches; at Benicia, 7 feet 6 inches; at Sacramento, 2 feet 6 inches; at Stockton, 2 feet 1 inch. At Crescent city, on the north, the maximum rise of tide is 9 feet; at San Diego, on the south, 7 feet.

### SAN DIEGO HARBOR.

San Diego harbor is on the extreme southern portion of the coast line within the boundary of California, in San Diego county, latitude 32°41′, four hundred and fifty-six miles south of San Francisco. It is next in importance to San Francisco bay, both in security and geographical position. It was the principal harbor of Upper California until 1830. It is well sheltered from all winds by surrounding hills, but has few of the advantages for inland traffic possessed in such an eminent degree by San Francisco. The harbor is in the form of a broad curve, about twelve miles in length, and from one to two miles wide. For about five miles from its entrance there is a channel half a mile wide, in which there is never less than thirty feet of water, with excellent anchorage, on a sandy clay bottom.

Being several hundred miles more directly in the track of the China and Sandwich islands steamers than San Francisco, it might become a formidable rival to that port in the important trade with those countries were it connected with a railroad across the continent; but the resources of the country are being so slowly developed that it is not probable such a railroad will be built in the immediate future. The California, Mexico, and Oregon Steam Navigation Company contemplate erecting a wharf here, which would be a great benefit to the trade of the place, and aid in developing the wealth of the country. The trade is at present confined to shipping wine, wool, and other products.

### SAN PEDRO BAY.

This bay is in Los Angeles county, three hundred and seventy-three miles south of San Francisco. This harbor is formed by a spur from Point St. Vincent, which trends to the south about eight miles, and

Deadman's Island, which lies across its end, while the mainland on this portion of the coast, trending to the southeast, forms a capacious bay, sheltered from all except the southerly winds—the most dangerous along that coast during the fall and winter. The water for several miles from the mainland, is very shallow, vessels being compelled to anchor about two miles off shore, but there is plenty of water and good anchorage near the island. All the freight and passengers, by steamers and sailing vessels, are placed on board and landed by means of lighters. The port of San Pedro lost much of its importance in 1858, when the town of Wilmington was established, at the head of what is now called Wilmington bay, about four miles further inland, and nearer to the city of Los Angeles, but there is considerable trade there now. It is the port for the fishermen of Santa Catalina and Santa Barbara islands, and a large portion of the produce of Los Angeles and Santa Barbara counties is shipped and supplies landed here. It has been proposed to erect a breakwater at San Pedro, from Deadman's island to Rattlesnake island, about one and a quarter miles in length, running north and south, and from Fisherman's point, near the old San Pedro wharf, about half a mile in length, running east and west. Were these walls built, San Pedro would be the safest and most commodious harbor on the southern coast. As this is the most convenient point for shipping the valuable produce of Los Angeles and San Bernardino counties, a safe and capacious harbor becomes a matter of importance connected with the development of the resources of that section of the State. The necessity for using lighters in shipping or landing freight does not conform to modern American ideas of commerce. As there is no remedy for the present condition of matters in this vicinity, except the construction of a breakwater, it is almost certain that one will soon be built.

Anaheim landing, the center of the wine trade of Los Angeles, is located on the northern bank of the Santa Ana river, about ten miles south from Wilmington. Here, also, the water is so shallow that vessels are compelled to anchor three miles from the shore, all goods and passengers being landed in lighters or boats. The Anaheim Lighter Company does an extensive business in loading produce and landing supplies for the wine and fruit growers, farmers and stock raisers in the district.

### THE SANTA BARBARA CHANNEL.

This roadstead is formed by the islands of San Miguel, Santa Rosa, and Santa Cruz, which are about twenty miles from and parallel with the mainland, south of Point Concepcion, where the coast line trends almost due east for about sixty miles. This channel affords shelter on the north and south, but is exposed from the east and west. There is plenty of water and good holding ground in the middle of the channel, but the whole coast, nearly as far down as San Diego, is shallow for several miles from the shore.

There is a good wharf at the town of Santa Barbara, which runs out nearly one thousand feet, and enables vessels drawing twelve feet of water to load and unload alongside. This section of the State, being chiefly devoted to cattle and sheep raising, the shipping business is not very extensive. Wool and hides form leading items in the exports.

The extensive deposits of asphaltum which exist on this section of the coast give employment to several vessels in supplying the demand for the San Francisco market, where it is largely used for paving and other purposes. The vessels engaged in this business load from the beach, where they collect the material. The following plan for loading asphaltum will explain the nature of the coast in this vicinity, and be interesting as an illustration of Yankee inventiveness. The proprietor of a large deposit of this mineral found it impossible to get it on board vessels to send to a market. The breakers, which curl with great fury for miles along the coast, stove all the boats he used, and the shore was so hard and rocky that piles could not be driven to make a wharf, and the vessels were compelled to lay too far out to make a connection with the shore. As a last resource, he hit upon an expedient. Having a number of yoke of well trained oxen, they are made to haul a large cart containing three or four tons of asphaltum through the surf beyond the breakers, where boats from the vessel are in waiting to receive it, the oxen standing up to their ears in the salt water while the boats are being loaded. About twenty tons a day are loaded in this manner.

At San Buenaventura, about twenty-five miles southeast from Santa Barbara, there is a landing at which it is contemplated to build a wharf to connect with a road from this place to Owens' valley, via Havilah, Kern county. Should this project be carried out, it would greatly increase the importance of Santa Barbara as a shipping port.

### SAN LUIS OBISPO BAY.

San Luis Obispo bay is a small, open indentation on the coast-line, with good anchorage and plenty of water, south of Point San Luis, a spur of Mount Buchon, which projects five or six miles to the westward, affording shelter from northerly gales. It is in San Luis Obispo county, about two hundred miles south of San Francisco, but is of little importance as a harbor.

About ten miles further north is Estero bay, formed by a bold headland terminating the Santa Lucia mountains, which projects to the north-west, and thus affords a much better shelter than San Luis bay. A deep lagoon runs inland three or four miles behind Estero point, in which there is excellent anchorage and good conveniences for a road and landing. This lagoon is sheltered from all points, except the south. The California, Oregon and Mexico Steamship Company have had this place surveyed, with a view of making it a refuge for their vessels during the prevalence of northerly and westerly gales; such a place of safety being very much required on this portion of the coast.

There are a number of other places between Estero point and San Pedro, which are well adapted for coasting harbors, but they afford little shelter from the most dangerous winds that blow along that part of the coast.

### MONTEREY BAY.

Monterey bay is ninety-two miles south of San Francisco. It is a broad, open bay, about thirty miles wide, circular in form, Point Pinos forming its southern, and Point New Year its northern headlands. Santa Cruz harbor is near the latter, and Carmelo bay near the former. These afford shelter to vessels, from certain quarters, but the bay of Monterey is exposed to all except easterly winds. There are a number of points around this bay, where coasting vessels carry on an extensive business. There are wharves erected for their accommodation, at Watsonville, Soquel, Miller's landing, Pajaro, (at the mouth of the Pajaro river, the port of the rich valley of that name,) and Millard's point. The wharf at Aptos creek is eleven hundred feet in length, from low-tide water. Considerable improvements have been made at Monterey wharf, which is now carried out to deep water. Before this improvement, passengers and freight were landed, from little boats, on the rocks along the shore.

The wharves at the mouth of the Salinas river have also been greatly improved. The dimensions of this river increase so greatly during the winter season, as to make it a risky business to build expensive wharves along its shores. Its usual width, at the entrance of the bay, is about four hundred and fifty feet. In 1862, during the wet season, it exceeded a mile.

The bay is safest and most sheltered in front of the town of Monterey, under the lee of Point Pinos, but the trade is not in that direction. Carmelo bay, on the other side of this point, is also tolerably well sheltered, but it is not convenient for shipping. This little bay is one of the most delightful places along the coast. The mission of San Carlos was located here, its massive ruins still remaining to show the taste and skill of its early builders. It was from this bay that the granite used for building purposes at San Francisco, was obtained, before the discovery of the quarries at Folsom.

One of the most pleasant trips for a summer day is across Monterey bay, from Santa Cruz to the old town of Monterey. The two places are twenty-one miles distant by water, but forty-five miles by land. The water is so peculiarly transparent that the rocks, pebbles, and mosses at the bottom, are distinctly seen, to the depth of nearly twenty feet, while the shore of the bay in the vicinity of the old town is bold, rocky, and exceedingly picturesque. The town itself is located in a sort of nook on the side of a gently sloping hill, every house in it being visible from the water. It is surrounded by lofty hills, crested with pine and redwood, which lend a peculiar charm to the scene, embracing the clear waters of the bay in the foreground, with the dark, moss-covered rocks along the shore, and the hill side dotted with the white dwellings in the city, surmounted by the dark green belt of timber which forms a fringe against the pale blue sky. Beyond the beauty of the scenery and the interest felt in the place, there is little to attract strangers to Monterey.

Several parties of whalers have had their headquarters in this bay for some years past. They ship from five hundred to fifteen hundred barrels of oil annually to San Francisco. If the contemplated breakwater, near Santa Cruz, is ever completed, Monterey bay will become of great importance to the commerce of the coast.

### SANTA CRUZ HARBOR.

Santa Cruz harbor is eighty miles south of San Francisco. It is situated at the northern extremity of Monterey bay, in Santa Cruz county, latitude 36° 57′, on the westerly slope of the Santa Cruz ridge of the coast range. It is one of the most important ports on the southern coast, being the outlet for the products of an extensive section of the richest agricultural and timber lands in the State, and the seat of a rapidly expanding manufacturing interest. Over one third of all the lime used at San Francisco, is shipped from this port, and there are extensive manufactories of powder, paper, leather, and a number of lumber-mills, which ship their products and receive their supplies from this place, giving employment to a large amount of tonnage—both sailing vessels and steamers.

The San Lorenzo, a beautiful stream of fresh water, which in its course affords motive power to numerous factories erected along its banks, passes through the town of Santa Cruz, into the bay of Monterey.

This harbor is small, but has twenty-four feet of water at low tide, with good anchorage, and is well sheltered except from the southwest, which makes it dangerous to enter or leave during the prevalence of winds from that quarter.

It is in contemplation to erect a breakwater, to protect this exposed portion. The officers of the United States coast survey have made several examinations of the locality for this purpose. It has been suggested that a wall, extending from Seal Rock point for two thousand feet, eastward, across the bay of Monterey, and a few feet above high water-mark, would make this a safe resort for vessels during the southerly gales, so dangerous along the coast, and from which there is no place of shelter at present. The erection of a light on Seal Rock point, or some other suitable place in the vicinity, has become a necessity, in consequence of the increasing importance of the trade of Santa Cruz—second only to that of San Francisco.

### HALF MOON BAY.

This bay is in San Mateo county, forty-six miles south of San Francisco. It is of little importance as a harbor, but is a most convenient point for shipping grain, produce, and lumber, from that portion of the coast to San Francisco. Spanish town, quite a thriving place, is located at the landing on this bay.

### DRAKE'S BAY.

Drake's bay is in Marin county, south of Point Reyes, and thirty miles north of the Golden Gate. It is of no importance, except as being the place where the great English navigator, whose name it bears, landed. It is sometimes called Jack's harbor, a name given to it by the fishermen, who resort there to follow their vocation.

### TOMALES BAY.

This bay is forty-five miles north of San Francisco, in Marin county, latitude 38° 15′. It is formed by an inlet of the Pacific ocean, which here penetrates the Coast Range about sixteen miles, nearly to the center of Marin county, averaging about a mile and a quarter wide for about twelve miles from the entrance, which is less than half a mile wide. There is a bar at the mouth of this entrance, having eleven feet of water at low tide.

It is perfectly land-locked, and sheltered from all winds. It has two small islands about three miles from the entrance, about two acres in extent, which are covered with verdure. Its safety, and the beauty of the surrounding scenery, makes it a sort of miniature copy of the bay of San Francisco.

The surrounding country is famous for its agricultural products, particularly butter, of which article Marin produces more than any other county in the State.

The lands around this beautiful little bay are high, but gently undulating in outline. The hills, being covered with grass and wild oats, afford pasturage for extensive flocks and herds.

Preston's point, on the east side of the bay, and about three miles from its entrance, named in honor of R. J. Preston, the pioneer settler in the district, is destined to become the site of an important agricultural trade. There is a good wharf here, eleven feet of water alongside, where there is generally quite a fleet of schooners, loading produce for the San Francisco market, this being the most convenient shipping port for Bloomfield, distant only nine miles, and for a number of villages scattered throughout this section of the county. Olema, one of the most thriving towns in the county, is located immediately at the head of this bay. Four miles from its south-east shore, on the banks of a beautiful stream of water—the Tokeluma, which flows from Mount Tamalpais—is located the *Pioneer* paper-mill of California.

### BODEGA BAY.

This harbor is formed by a narrow spit of land, about two miles in length, which projects from the south of Bodega Head and extends to within three miles of the spit which forms the western side of Tomales bay. The two bays are reached through the same entrance, between these spits. It is very much smaller, and scarcely as well sheltered as Tomales bay, being open to the southerly gales, which sometimes blow with considerable violence during the fall. It has but nine feet of water at low tide. The Russians selected the point of land forming the western side of this harbor for their settlement, which they maintained from 1812 to 1841.

A considerable trade is carried on in the shipment of produce, there being good anchorage and wharf accomodation for vessels engaged in the business. The town of Bodega is located at the head of this bay about fifty miles distant from San Francisco.

### HUMBOLDT BAY.

Humboldt bay is two hundred and twenty-three miles north of San Francisco, in Humboldt county, latitude 40°44′. It is a securely land-locked harbor—the best on the northern coast—formed by two densely timbered peninsulas, which enclose a very handsome bay, about twelve miles in length, and from two to five miles in width, its shores thickly timbered with magnificent pine and redwood, to the water's edge. The entrance to this bay is about a quarter of a mile wide, with eighteen feet of water at low tide. It is somewhat difficult for sailing vessels to make this entrance at certain seasons, but there are powerful tow boats belonging to the port which are always on hand when required. The upper portion of this bay is quite shallow, but there is plenty of water and good anchorage along the lower portions. There is an extensive trade in lumber, salmon, and produce carried on here, as well as considerable ship building.

The Elk and Jacoby rivers passing through a good agricultural country, empty into this bay, and there are several good roads connecting it with the interior. Eureka, the county seat, and Arcata, are located on the shores of the bay. The Eel river settlement is about forty miles distant, inland. This important harbor was not discovered until 1850, when a party of prospectors, among whom was a lumberman from New Brunswick, while searching for gold, saw it, and perceiving the advantages it presented for obtaining and shipping lumber, they abandoned gold hunting, and set to work cutting timber. The first log was cut in July, 1850; since that time, 400,000,000 feet have been sent to market, vessels loading in the bay for the Sandwich Islands, China, Australia, and Central America, as well as for San Francisco.

### TRINIDAD BAY.

Trinidad bay is an open roadstead, sheltered to some extent from the north by a point of land extending at an acute angle about a mile to the south. The town of Trinidad is located at the base of this point. It is in Klamath county, two hundred and thirty-nine miles north of San Francisco, in latitude 41°03′. It has better anchorage and deeper water than Crescent City, from which it is distant about forty miles. The principal trade of the place is in lumber of which the county produces large quantities, most of it being shipped from this point.

### CRESCENT CITY HARBOR.

This is an open roadstead, in Del Norte county, two hundred and eighty miles north of San Francisco, in latitude 41°30′, near the extreme northern boundary of the State. The harbor is formed by Point St. George, a bold headland projecting nearly a mile to the west, on the south of which a plain about twenty miles in length, and from six to seven miles in width, forms the coast line. Crescent City, the county seat, is located on the south of this plain. A considerable trade is carried on with the mining districts in the mountains adjoining, in both Oregon and California, this being the nearest place for obtaining supplies.

The mountain regions, comprising about nine tenths of the county, also produce large quantities of redwood, pine, and fir, that make excellent timber, which is shipped from this port in considerable quantities. There are good wharf accomodations for vessels to load, but the harbor being exposed to the fury of the southwesterly gales, it is not safe when the wind blows from that quarter. In 1862, a violent gale destroyed nearly four hundred feet of the wharf, which was, at that time, thirteen hundred feet in length. It has been greatly extended and improved since.

The anchorage is indifferent, and the water along the coast, south of the point, so shallow that vessels drawing twelve feet of water are not safe within half a mile of the shore, except at the wharves in front of Crescent City.

### IMPROVEMENTS TO BE MADE.

The subject of improving the harbors along the coast bounding this State, and establishing places of refuge in which the large fleet of steamers and sailing vessels engaged in the coasting trade can find shelter in emergencies, appears to be attracting the attention of the Federal government. Several examinations have recently been made by officers especially detailed for this purpose. In view of the rapidly expanding foreign and domestic commerce of California, which is exceeded by that of few States in the Union at present, it would appear to be the duty of the government, independent of all political considerations, to have everything done that is necessary to afford security or facilities to the shipping engaged in this commerce. It is urged by those most interested in this matter, that lights are required at Point Reyes, at Santa Cruz, and at San Pedro, and that breakwaters be built on the north of Monterey bay, and at the mouth of the harbor of San Pedro. From the outline of the coast harbors given in the foregoing, the necessity for these improvements appears obvious.

## ISLANDS ON THE COAST OF CALIFORNIA.

The Farallones consist of two clusters, comprising seven islands, the nearest of which is about twenty miles west from the Golden Gate. They are all utterly destitute of soil and vegetation, consisting of bare, rugged rocks, which are the resort of immense numbers of sea-lions, and of myriads of birds, the eggs of which at one time were a source of great profit to those who collected them. As many as 25,000 dozen were collected in some seasons lasting from the middle of May until the middle of June, which sold at from thirty to fifty cents per dozen. The southernmost of the group is the largest, containing about two acres, and is also the nearest to the coast. On this there is a first-class lighthouse, to warn the mariner of the dangers of the locality.

No water fit for drinking, except such as was collected from rains and fogs, was obtainable on any of these islands until 1867, when some of the egg-gatherers discovered a spring on the main island, within a half-mile of the lighthouse. The water from this spring, which is of a pale amber color, and pleasant to the taste, possesses important medicinal qualities: by analysis, it is found to contain chlorides of sodium, lime, and magnesia, with traces of sulphate of ammonium and free hydrochloric acid.

There are no other islands on the coast of California north of Point Concepcion. South of that headland, there are two groups, the most northerly consisting of the islands of San Miguel, on the west; Santa Rosa, in the center; and Santa Cruz, on the east. They are nearly in a line, parallel with, and about twenty miles distant from the mainland, in Santa Barbara county, and form the southern boundary of the Santa Barbara channel.

Santa Cruz, the largest of this group, is twenty-one miles in length, and four miles wide, and has a rugged surface. The Messrs. Barron, of San Francisco, who own this island, graze about thirty thousand sheep upon it.

Santa Rosa is fifteen miles in length, and nearly ten miles wide. Its surface is tolerably level, and produces a thick crop of coarse grass and low bushes; but its steep, rugged sides, which rise nearly two hundred feet almost perpendicularly, afford no good landing place. This island was once inhabited by a large tribe of Indians, who, until 1840, furnished the currency for all the tribes along that section of the coast, and from the Tulare valley. This currency was called *ponga,* and was made of the hard shell of a species of edible mollusca, which abounds along the southern coast. These shells were rounded, had a hole made in the middle, and were strung on fibres of wild hemp. This was the only currency in the country until 1820. Santa Rosa is now inhabited by several Mexican families, who raise a considerable number of cattle, besides herding ten thousand sheep.

San Miguel is nearly eight miles long, and from two to three miles wide. It is almost a barren rock; but several thousand sheep manage to subsist upon the limited pasturage growing on the island. About forty miles southeast from the above cluster of islands, and off the coast opposite Los Angeles county, are the islands of San Nicolas and Santa Barbara, and still further in the same direction are Santa Catalina and San Clemente. These are not so close together, or as near the shore, as the others.

San Nicolas, the most western, is nearly sixty miles from the main land. It is eight miles in length, by about four miles in width. Its surface is a flat ridge, nearly six hundred feet high, tapering down in rocky ledges to the sea. It is occupied as a sheep ranch; about eight thousand of these animals appear to thrive on the scant herbage it produces.

Santa Barbara lies about half-way, and nearly in line, between the main land and San Nicolas. It is nearly circular in outline, and about two miles in diameter at the base; its surface, on the top, containing about thirty acres. It is about five hundred feet high—steep and rocky on all sides, and is tenanted by swarms of sea-lions, gulls, and other aquatic birds.

Santa Catalina, the largest island of this group, is about four hundred miles south from San Francisco, and twenty-five miles from San Pedro, its nearest point to the main land. It is nearly twenty-eight miles in length, about seven miles wide on its southern, and two miles on its northern end. Its surface is rough and uneven, some points being three thousand feet above the sea-level, but contains several small valleys which are under cultivation, fruit-trees and vegetables thriving in these sheltered places, while quite large flocks of sheep find pasturage among the surrounding hills. There is a small stream of pure water running nearly through its entire length; it also has a number of springs of fresh water. The mountains contain several large veins of white quartz, in which there are numerous deposits of argentiferous galena and copper ores. Wild goats, hogs, and quail abound in the upper portion of the hills. It has two good harbors near its center—Catalina bay on the south, and Union bay on the north—

which are separated by an isthmus about half a mile wide. It was taken possession of by the United States, for military purposes, in January, 1864, and a company of soldiers have been stationed there since. This island, when first discovered, was inhabited by a tribe of Indians, who carried on quite a trade with the natives of the mainland, by means of large canoes. Not a relic of the race remains.

San Clemente, the most southern, lies about fifty miles from the main land, off San Diego county. It is twenty-two miles in length, by about two miles in width, being but little more than a series of rocky peaks, some of which rise upwards of one thousand feet above the level of the sea. It contains neither soil, vegetation, nor water. It is occasionally visited by seal-hunters, who make considerable quantities of oil from some of the animals found there.

# CHAPTER III.

## THE COUNTIES OF CALIFORNIA.

Southern, Coast, Northern, Mountain and Valley Counties. Southern Counties: San Diego—San Bernardino—Los Angeles—Santa Barbara—San Luis Obispo—Kern. Coast Counties: Monterey—Santa Cruz—Santa Clara—San Mateo—San Francisco—Alameda—Contra Costa—Marin—Sonoma—Napa—Lake—Mendocino. Northern Counties: Humboldt—Trinity—Klamath—Del Norte—Siskiyou—Shasta—Lassen. Mountain Counties: Plumas — Sierra — Nevada — Placer —El Dorado —Amador—Alpine—Calaveras—Tuolumne—Mariposa—Mono—Inyo. Valley Counties: Tehama—Butte—Colusa—Sutter—Yuba—Yolo—Solano—Sacramento—San Joaquin—Stanislaus—Merced—Fresno—Tulare.

The great extent and peculiar topographical features of California cause some districts within its limits to differ so widely from others in soil, climate, and natural productions, that it is necessary to make a classification of the counties into which it is divided, in order to convey a clear idea of its resources and capabilities.

The semi-tropical heat, scant vegetation, and broad arid plains of San Diego and San Bernardino counties, on the south, are as much in contrast with the cold, pine-covered mountain regions of Del Norte county, on the north, as the State of Maine is in contrast with Florida. The counties embracing the crests of the Sierra Nevada, which have a climate of almost polar severity, inhabited solely on account of their mineral wealth, cannot, with propriety, be classed with those among the foot hills, which are as important for their agricultural as for their mineral resources; nor can these be classed with those in the Coast Range, or with those in the great central valley.

This extraordinary diversity of climate and soil, the dividing lines of which are so difficult to define, enables California to produce in perfection the grains, fruits, and vegetables peculiar to all countries—the olive, orange, pomegranate, cotton, and tobacco, flourishing in close proximity to the potato, wheat, flax, and rye—and insures the growth of the finest wools in districts where the vegetation is of a tropical character.

The unavoidable difference in the form and dimensions of the fifty counties into which the State is divided, renders it impossible to make more than an approximate partition of its territory according to climate or products, but as they are well defined and generally recognized, they are adopted in preference to making arbitrary lines.

### SOUTHERN COUNTIES.

San Diego, San Bernardino, Los Angeles, Santa Barbara, San Luis Obispo, and Kern counties, comprise what is generally considered Southern California. Although only six in number, these counties embrace nearly one-third of the territory of the State. They contain above 50,000 square miles, or more than 30,000,000 acres of land, three fourths of which is adapted to agricultural or grazing purposes—much of it being the very garden of the State, producing the greatest variety of fruits, grain and vegetables.

The proportions of this important division of California not being clearly apparent through the above figures, we make the following comparison between them and some of the Atlantic States, because, although figures never lie, they do not always tell the whole truth: Massachusetts contains 7,800 square miles; Connecticut, 4,674; Rhode Island, 1,306; Vermont, 10,212; New Hampshire, 9,280; New Jersey, 8,320; Delaware, 2,120, and Maryland, 11,124; a total of 54,836 square miles for eight Atlantic States. These six southern counties of California contain nearly as much territory as all of those States, and a great deal more than either of the great States of New York, Pennsylvania, or Ohio. The present population of these counties does not exceed twenty-five thousand.

### COAST COUNTIES.

Monterey, Santa Cruz, Santa Clara, San Mateo, San Francisco, Alameda, Contra Costa, Marin, Sonoma, Napa, Lake, and Mendocino counties, located along the Coast Range, are classed under this head. They embrace only a small portion of the territory of the State, but contain the greater portion of its wealth and population, and are the chief centers of its trade, commerce, and manufactures.

### NORTHERN COUNTIES.

Humboldt, Trinity, Klamath, Del Norte, Siskiyou, Shasta, and Lassen counties, comprise Northern California. They embrace a territory extending from the fortieth to the forty-second parallel of north latitude, and from the one hundred and twentieth to the one hundred and twenty-fifth degree of longitude, west.

### MOUNTAIN COUNTIES.

Plumas, Sierra, Nevada, Placer, El Dorado, Amador, Alpine, Calaveras, Tuolumne, Mariposa, Mono, and Inyo, embracing the main chain of the Sierra Nevada mountains, are considered the mountain counties. They are comparatively small in size, and although containing nearly all the important gold and silver mines in the State, the whole territory of the ten principal mining counties is not as large as that of the pastoral county of San Bernardino.

### VALLEY COUNTIES.

Tehama, Butte, Colusa, Sutter, Yuba, Yolo, Solano, Sacramento, San Joaquin, Stanislaus, Merced, Fresno, and Tulare counties, located in the great central valleys, between the Sierra Nevada and the coast ranges, are classed as valley counties.

## SOUTHERN COUNTIES.

### SAN DIEGO COUNTY.

San Diego county comprises the most southern portion of the State. It extends along the border separating it from the peninsula of Lower California, from the Pacific Ocean on the west, to the Colorado river, on the east—a distance of one hundred and fifty miles. From north to south the county is one hundred miles in length. It is bounded on the north by San Bernardino county, on the east by Arizona, on the west by the Pacific Ocean, and contains 8,500,000 acres, of which the Colorado desert covers about 2,500,000 acres, about 4,000,000 of acres are mountains and cañons, and some 2,000,000 consist of level plains and valleys along the Coast Range, or among the mountains, suitable for farming or grazing.

Two unnamed branches of the Coast Range, passing through the county from north to south, separate it into three divisions, which differ as much from each other in climate, soil, and topographical features, as if they were in different portions of the globe. The division bordering the coast line forms a broad belt, nearly twenty-five miles wide, a very considerable portion of which consists of level plains or gently sloping valleys, which are watered by the San Bernardo, San Diego, San Luis Rey, Margarita, Sweetwater, and other rivers, some of which are permanent streams, others dry up during the summer. The greater portion of the land in this division is adapted for agricultural and grazing purposes. Most of it is unoccupied.

The central, or mountain division, is very irregular in outline, and averages nearly forty miles in width. It contains extensive tracts of good farming land. The Santa Isabel district, about seventy miles easterly from the town of San Diego, embraces a number of broad valleys, or rather table lands, which lie between the two main ridges of the mountains, at an elevation of three thousand to four thousand feet above the level of the sea. The culminating peak of these ranges, Mount San Jacinto, is five thousand five hundred feet high. This district enjoys a delightful climate. The vine, orange, wheat, and barley, are among its products. It is the best agricultural district in the county.

The mountains are covered with forests of oak, cedar, pine and fir. Gold, silver, copper, and other minerals have been found in many places, in both ranges.

To the east of this mountain division, lies the great Colorado desert, extending to the borders of the State on the south and east. This desert, though treeless and arid for many miles along its northern and western borders, consists of a rich, fertile soil on the south and east. It is evidently a delta formed by the confluence of the Gila and Colorado rivers, which once flowed over it, but have cut a new channel for themselves in another direction, although this desert is still below the level of the waters of the gulf into which they both flow. This curious fact induced Dr. O. M. Wozencraft to entertain the idea that he could reclaim the greater portion of this land by cutting a canal from the Colorado, to irrigate it. This subject was before Congress, in 1858 and 1859, and received favorable action, but the project was never carried out, although it is entirely practicable, and will doubtless be accomplished some day.

This desert, shut off from the benefits of the sea breezes by the high peaks of the Coast Range, which condense all the moisture from the air before it passes their limits, is the hottest place in the State. The thermometer at Fort Yuma, located at its south-east corner, sometimes reaches 122° Fahrenheit, in the shade, during the summer; but this great heat does not affect the health of the inhabitants, or prevent them attending to their affairs.

Great changes have taken place in the topography of this desert district, within the past thirty years, and others are still in progress. In 1840, it was partially submerged by the waters of the Colorado. The New river, through which a portion of these waters now finds its way to the sea, had no existence until that year. A number of large lagoons remained for several years after that inundation. The northern portion of this desert is one of the most interesting districts in the State, for observing many of the curious operations of Nature. About sixty miles from Warner's ranch, and a few miles southwest from Dos Palmas, a station on the La Paz road, there is a broad valley, bounded by ranges of hills of hard-baked, red clay, called the Chocolate and Coyote mountains; and in this valley is the dry bed of a lake forty miles in circumference, which is nearly sixty feet below the level of the sea. This great basin is separated from the dry beds of a number of creeks, which appear to have once been connected with it by a level plain, about five miles wide. Nearly in the center of this plain there is a lake of boiling mud, about half a mile in length by about five hundred yards in width. In this curious cauldron the thick, greyish mud is constantly in motion, hissing and bubbling, with jets of boiling water and clouds of sulphurous vapor and steam bursting through the tenacious mud, and rising high in the air with reports often heard a considerable distance. The whole district around this lake appears to be underlaid with this mud, as it trembles under foot, and subterranean noises are heard in all directions. Hot springs and sulphur deposits are numerous for many miles around this lake. In 1867, a large spring of cool, pure water, commenced flowing from a fissure in a high bluff of rocks, a few hundred yards from the station at Dos Palmas, where there had been no water before. There had been no earthquake or unusual subterranean disturbance, to account for such a phenomenon, which is all the more strange from the fact that none of the wells sunk in any part of the desert, contain sweet water: it being always so impregnated with alkali as to be very unpleasant to the taste. The whole section around these springs and mud volcanoes, appears to be gradually rising.

From Warner's ranch, a town located on the eastern side of the Coast Range, near Warner's pass, on the Fort Yuma road, at the western edge of this desert, for about thirty miles south to Vallacito, the country has a less desolate appearance. The coast mountains, covered with timber and chaparral, skirt the desert on its western side, and take from it the monotonous and dreary character which marks the broad, sandy plains beyond this point, where the country is indeed a desert, without a sign of animal or vegetable life, or a drop of water, for nearly sixty miles. This long stretch of hot, shifting, alkaline sand, was a terror to travelers until the Government, in 1850, caused several wells to be sunk at a place since known as Sackett's wells, about forty miles from Vallecito, which furnished a fair supply of water, such as it was, till June, 1867, when a terrible sand-storm covered the whole country in that vicinity with a bed of sand several inches deep, obliterating the wells and all the landmarks around them.

The shifting sands on this portion of the desert, when disturbed by the tempests which frequently pass over them, are as dangerous to travelers as the fearful siroccos which sweep over the deserts of Arabia, and change the whole appearance of the country in a few hours, obliterating roads and landmarks intended for the guidance of the wayfarer.

Near the boundary-line towards Arizona, after crossing the New river, the appearance of the country changes completely. Although still in the desert district, it is no longer a desert; but the vegetable and animal life are strange in form and habits. Instead of the shifting sand, there is a soil of greyish tint, nearly as hard and compact as brick, covered with a scant crop of short, wiry grass, among which grow an infinite variety of cacti, of all shapes and sizes—from the slender "rat-tail" to great squat lumps as large as nail kegs, and about as handsome in form, all covered with spines and prickles, as if Nature had tried to make them as hateful as possible. The mesquite also grows luxuriantly in this section, giving it a forest-like appearance as compared with the sandy plains. The Indians from Arizona and Lower California, pay this portion of the desert a visit each fall, to collect a winter's supply of the nutritious beans of this tree. Here, too, may be seen swarms of paroquets, orioles, and other birds, of the most brilliant plumage, which aid in giving the whole scene a decidedly tropical character.

The town of San Diego, located near the harbor of the same name, is the oldest settled place in the State. It was established in May, 1769, by the missionaries, when they founded the first California mission—located about six miles inland from the town. San Diego, the Spanish for St. James, the titular saint for this mission, gives his name to the county, town, and bay. It was called *Cosoy* by the aborigines, of whom many thousands lived on the coast plains when the missionaries arrived there. There are scarcely any there now. The town contains between 300 and 400 inhabitants, a large proportion of whom are Mexicans and native Californians. It is five hundred miles from San Francisco, and one hundred and twenty-five miles from Los Angeles.

About a mile from the old town, and near the bay, is New San Diego, which has been built within a year or two, where the government storehouses and several substantial residences, and a new wharf, have been erected for the accommodation of trade. The California, Oregon and Mexico Steamship Company are about to erect a wharf and warehouse, to conduct the increasing business of the port.

There has been quite an increase in the number of settlers in the county, during the past year. Several of the old Mexican ranchos, which embraced miles of good land, have been purchased and subdivided among American farmers, who will soon make it produce something more valuable than hides and tallow.

The mission near the old town had the largest and most beautiful church, and buildings, on the coast. They covered several acres, and were surrounded by extensive gardens and orchards, which produced a great variety of fruits and flowers. The old church, now crumbling to ruins, affords evidence of the architectural skill of its reverend builders. Its bells, which for nearly three quarters of a century summoned the Indian to labor and prayer, were taken from the belfry as recently as 1866. The church property at present belongs to the Catholic bishop of the diocese. The old gardens are nearly all destroyed, only a few olive trees remaining to show where they had been.

San Luis el Rey—or, more properly, San Luis Rey de Françia, in honor of Louis IX, of France, a warrior in the time of the crusades—is near the harbor of that name on the coast, about forty-six miles north from San Diego. It is located in a beautiful valley, about a mile wide, and twenty-four miles in length, through which passes a permanent stream of water, the San Luis river. The mission of San Luis Rey was located in this valley, at the head of which now stands the town of Pala.

The orange, lemon, lime, citron, walnut, fig, olive, and other tropical fruits, grow to perfection in this valley, as well as wheat, barley, potatoes and corn, but it is only partially under cultivation.

Temecula, about twenty miles north from Pala, is another town of some little importance. It contains about sixty Americans, two hundred Mexicans, and nearly six hundred Indians. It was proposed to establish a reservation at this place for the protection of the Indians, who are more numerous and better behaved here than in any other portion of the State. They live on rancherias, cultivate considerable land, and own many cattle, sheep and horses. This town is located on the bank of the San Margarita river, on the southern edge of a series of plains extending nearly forty miles to the eastward, which comprise some of the finest grazing lands in the southern portion of the State, being covered with wild oats, clover, and other nutritious grasses, furnishing pasturage for thousands of cattle, horses, and sheep. These plains are watered by numerous lagoons, formed along the beds of the rivers which do not flow to the sea, except during the winter. Much of this fine land is owned by Mexicans, in large tracts. Some of these people live in the same style they did before the country became a State. One of these native rancheros, living near Temecula, who owns several leagues of these plains, and has nearly five thousand head of cattle grazing on them, never saves a drop of milk, or makes a pound of butter—these being luxuries in little use here.

Warner's ranch is another small town, about forty-five miles easterly from Temecula.

Fort Yuma, a military post in the extreme southeast corner of the State, has caused a number of settlers to locate in that vicinity, where there are placer gold mines of some importance, in what is known as the Picachto district.

The principal products of the county are cattle, sheep, hides, wool and tallow. The great distance from the central market at San Francisco, and the limited home demand, render it unprofitable to raise the cereals for exportation. Oranges, olives, almonds, raisins and figs, can be cultivated with success in this county. It has a fine climate, rich soil, and a good harbor, and contains gold, silver and copper mines; but its resources are quite undeveloped, for want of population.

## SAN BERNARDINO COUNTY.

This is the largest county in the State, containing more than 10,000,000 acres, about three-fourths of which consist of dry, desert valleys, volcanic ranges, and inaccessible mountains, though not wholly without mineral wealth. About 3,000,000 acres are covered by the Coast Range and other mountains, portions of which are valuable for mining, grazing, and lumbering. Much of the finest land in the county is covered by extensive Mexican grants, some of which embrace tracts of eleven square leagues. These large ranches have been great impediments in the way of settling the southern counties; but within the past year, there has been every opportunity offered to actual settlers, to purchase in subdivisions.

The county, which was not organized until 1854, (prior to this, it formed part of Los Angeles county,) takes its name from a mission founded by an early Spanish settler named Lugos, who once owned the whole of the San Bernardino valley, cultivating it chiefly by Indian labor. This mission stands about ten miles southeast of the old town of San Bernardino.

The county is bounded on the north by Inyo county, and the State of Nevada; on the east by the Colorado river; on the south, by San

Diego county and on the west, by Kern and Los Angeles counties. The Sierra Nevada makes a short, easterly curvature on the northwest of this county, leaving a tract of wild desert and broken volcanic ranges on the north and east, nearly one hundred miles in length by one hundred miles in width, of which scarcely any portion is fit for human habitation; but, being rich in gold and silver, numerous mining districts have, from time to time, been laid out and partially developed. These mining districts are in the north of this great wilderness. The Slate Range, Washington, Argus, Telescope, Armagosa, Potosi, and several others, attracted some attention a few years since, but the country is such a miserable desert, without wood or water, that even gold, unless in large quantities, will not secure its permanent settlement. Nearly all of these districts have been abandoned, although some of them are known to be rich in the precious metals.

The whole of this great range of country presents the appearance of having been broken and torn by subterranean fires, which melted the hard rocks into rough, jagged masses, after which they were submerged beneath the ocean for ages, until their extreme roughness was worn off by currents of water charged with sand and gravel, when they were again elevated above the waters, covered with salt lagoons, drift sands, and great beds of gravel and mud.

The numerous beds of dry lakes and creeks found in all directions, mark where these upraised waters passed away. Here and there, the cones of extinct volcanoes, heaps of pumice, obsidian, and fragments of lava, boiling mud-holes, hot springs, and deposits of sulphur, show that the subterranean fires, which probably uplifted and depressed the country, have not entirely ceased their operations.

There is, probably, no portion of the State less inviting to the traveler, than this northern section of San Bernardino county. The vegetation is scant, and altogether different from that growing in the south-west corner of the county. The yucca *(yucca baccata)*, the small-nut pine *(pinus edulis)*, and western juniper *(juniper occidentalis)*, are all that approach in size to a tree, and these only grow sparsely among the granite ranges along the Mohave, and at a few other places among the mountains. The yucca is the most abundant. This curious plant is a variety of palm; it grows from five to fifteen feet high, with a stem from six inches to a foot in diameter, having from two to five branches; its leaves, which resemble the blade of a bayonet, hang down the side of the stem, giving it a rugged, uncouth appearance. This tree forms a staple article of fuel over hundreds of miles of this country.

The sink of the Mohave, or Soda lake, lies in this section of San Bernardino county. The Mohave river flows from Bear valley, running through cañons, over and under the surface, for more than one hundred miles before it reaches the lake. This lake is about five miles wide, by about twenty miles in length. Although called a lake, it never contains any water, the whole stream of the river, during the rainy season, sinking beneath the alkaline soil as fast as it flows in. In 1867, the waters of this river were lower than they had been known for many years, notwithstanding the rains were heavier than usual. A number of new openings in the earth have been discovered along its course, through which the waters passed, leaving many springs dry that were never known to fail before. This fact corroborates our remarks concerning the gradual rising of the Colorado desert, referred to in the topography of San Diego county. The entire surface of this Soda lake is covered with carbonate of soda, to such a depth as to give it the appearance of a snow drift.

The great Death valley, in the north of this county, extends into Inyo in its northeastern corner. This frightful place, according to the surveys of Major Williamson, is from one hundred to two hundred and fifty feet below the level of the ocean, while, but seventy miles west of it are clustered a number of the highest peaks of the Sierra Nevada, many of which are from 12,000 to 15,000 feet in height. These facts will afford some idea of the wild confusion of mountains, cañons, and depressions that mark the topography of this portion of the State.

This valley, which owes its name to the melancholy fate of a large party of immigrants, who perished from thirst within its limits, in 1849, is one hundred miles long by twenty miles wide. For forty-five miles in length, and fifteen miles in width, along its center, it is a salt marsh, with a thin layer of soil covering an unknown depth of soft gray mud. The Amargoza river sinks into this marsh. The sides of the valley are steep and barren, a few mesquite, growing among the sands at its head, being all the vegetation to be seen. Its western bank is formed of gravel and hardened mud; on the east it is bounded by high mountains of slate and granite. There is no water fit to drink for many miles, and although there are numerous springs, they are all intensely alkaline. The whole surface of the valley, except the marsh in the center, is covered with sand and gravel, and is scarred in all directions with deep grooves, which appear to have been made by freshets, caused by heavy storms, or bursting of water spouts, that occasionally have done considerable mischief in the surrounding region within the past year or two. The heat of this valley is fearful during the summer.

An exploring party, who visited it in January, 1865, the coolest season of the year, found the temperature 90° Fahrenheit. When there is no breeze through the long cañon the air becomes so dense that respiration is painful and difficult. During the spring terrible gales of wind blow through this cañon in opposite directions, filling the air with salt, gravel, and sand, in clouds as black as coal smoke. Altogether it is as dismal and dreary a place as can be imagined. The Telescope mining district is located on the west side of this valley. There is gold in the gravel thereabouts, but there is no water to work it, or to drink.

The southwest corner of the county presents a much more inviting aspect. The finest portion of its agricultural lands is contained within this district. San Bernardino valley is located here. This beautiful valley is fifty miles in length by twenty miles in breadth, bounded on the east, north, and south by an amphitheatre of lofty mountains, covered with timber. From these mountains flow innumerable streams of water, which cause the whole valley to appear like a vast garden by the willow, sycamore, and other trees, that grow along their banks. The Santa Ana, quite a large stream, passes through the entire length of this valley. As may be readily conceived, a region thus sheltered and watered must have a delightful climate. Two crops of grain are gathered regularly in this district. The alfalfa grass, which is a perennial here, is cut six or eight times each year. Most kinds of fruit and grain flourish here. There are many extensive vineyards and orchards, the products of which would be of great value if they could be sent to market. The surrounding mountains contain abundance of pine, cedar, hemlock, maple, and other kinds of timber. There are only two grist mills and five saw mills in the entire county, and these are located in this district. The present town of San Bernardino, in this valley, on the banks of the Santa Ana, was laid out by the Mormons in 1847, on the same plan as Great Salt Lake City. The streets are at right angles, and each lot contains from one to five acres, so that every house is surrounded with a garden, orchard, and cornfield. The town consequently extends over a large space. Nearly all the Mormons abandoned the place in 1856, and went to Salt Lake, but a few still reside here, who carried on quite an extensive trade with Utah for several years. South of this valley, to the line of San Diego county, there are extensive plains and rolling hills, on which are many farms and ranchos in a high state of cultivation. A canal, or *zanja*, some ten miles in length, constructed by the Lugos, years before the State was formed, supplies a portion of this district with water for irrigation. All kinds of grain, and many varieties of fruit, are raised in perfection.

On the north side of the San Bernardino mountains, and about thirty-five miles from the town, in a wide plateau, or broad valley, are Holcombe and Bear valleys, which, from 1860 until 1862, attracted considerable attention. The gold mines, both placer and quartz, found here, yielded well for a time, after which operations were suspended, though within the past few months arrangements have been made to re-open these mines. Important discoveries of placer gold, or auriferous gravel, have been made on Lytle creek, about ten miles west from San Bernardino, towards the Los Angeles county line, near the Cajon pass, which is thought to be a rich gold mining district. Near the Morango pass, about thirty miles southeast from Holcombe valley, there are large deposits of copper ore. On the Santa Ana river, near the county seat, there are large beds of marble and alabaster. The county jail is built of this marble, and all the lime used in the county is made from it. The Temescal tin mines, discovered in 1854, (the only body of the ores of this metal found *in situ* in the State), are located in the Temescal mountains, about forty miles southerly from San Bernardino.

There is but one town, and few good roads in the county. The whole population does not exceed five thousand eight hundred. Quite an addition to the former number was made during the past year by settlers who have purchased lands, which are very cheap in this county.

### LOS ANGELES COUNTY.

This, the most important of the southern counties, is bounded on the north by Kern; by Santa Barbara, and the Pacific Ocean, on the west; the Pacific Ocean, on the south; and by San Bernardino on the east. In outline its boundaries are exceedingly irregular. It comprises about 2,000,000 acres, nearly two-thirds of which are fit for cultivation or for grazing purposes. It contains about 14,000 inhabitants. Los Angeles is more progressive than either of the other southern counties. A number of ditches for irrigating purposes have been cut in various districts within the past year or two, which have caused large tracts of rich land to be brought under cultivation that otherwise were only fit for pasturage.

The Sierra Madre mountains pass through the county in a northwest and southeast direction, from thirty to fifty miles from the sea, not only forming the divide of the waters, but separating the fertile plains and valleys sloping towards the ocean, from the sterile, hot and sandy desert, which stretches eastward towards the Colorado river. The Santa Susana mountains, a branch of the Coast Range, also cross the county, in a nearly east and west direction. Near Fort Tejon, in the northwestern portion of the county, at a point where the boundaries of Tulare, Kern, San Luis Obispo, and Santa Barbara counties converge, the Santa Inez and San Rafael mountains, of the Coast Range, after traversing Santa Barbara county, unite with the Sierra Nevada, and form a great cluster of peaks and deep cañons. The line of contact between the Coast Range and Sierra Nevada is traced for many miles, running east or southeast, being marked by immense beds of dark colored, compact lava, from two hundred to five hundred feet deep.

The shore line of the county extends from Point Duma to Point San Mateo, about ninety miles, presenting a series of low bluffs and long sandy beaches. The bay of San Pedro forms the only good harbor there is in the county. On the shores of this bay are located the old and new towns of San Pedro and Wilmington, both of which are shipping ports of some importance.

The principal rivers in the county are the Los Angeles, San Gabriel, and Santa Ana, which flow nearly all the year and connect with the ocean. There are a number of others which distribute water through the interior during the wet season, but rarely reach to the sea, and are generally dry during the summer.

The section of the county on the southwest of the Coast Range forms a series of plains and valleys which extend from Los Angeles plain to San Diego county, a distance of nearly fifty miles in length, by an average of nearly twenty miles in width, and comprise the most beautiful portion of the southern coast. The lower plain, containing the valleys of Los Angeles, San Pedro, and Anaheim, skirts the ocean, along which its border is from five to forty feet above the level of high tide, fringed, in some places, by a narrow, sandy beach. From the sea line it slopes gradually upward to the base of the foot hills, twenty-five to forty miles inland. The upper plain, or plateau, contains the San Fernando, San Bernardino, Cocomongo, Jurapa, and a number of other extensive valleys.

The soil and climate of the lower plains are remarkably uniform. The soil is a light brown, sandy loam, rich in vegetable matter, slightly more clayey near the bottom of hollows, and more gravelly on the dividing ridges between such hollows, but exceedingly fertile everywhere. The sea breeze, which springs up from the northwest between eight and ten o'clock A. M., during the summer, moderates the temperature and supplies sufficient moisture to prevent the heat being very oppressive. In the rainy season, which commences sometimes as early as November, never later than January, these plains are covered with wild grasses, oats and clover, even to the roads, if they are not well traveled. At this season, a ride over them presents some of the most beautiful views of southern California scenery. On the one hand are the vineyards, orange groves, and apple orchards, clothed in the variegated tints of autumn, and backed by brown mountain ranges, tipped on their crests with silvery snow, or fringed with dark pines, forming a serrated edge against the bright blue sky, while over the sloping plain all is green and brilliant as a bed of emeralds. On the other hand, the placid ocean, pale azure in tint, just rippled on its surface by a gentle breeze, dotted here and there with the white sail of some coasting craft, and margined by the vividly green plain, forms a series of pictures that a Bierstadt might well delight to copy.

The equable temperature and rich soil of this section of Los Angeles county, render it one of the most attractive portions of Southern California. Here the grape, of all varieties, from all countries, thrives luxuriantly. The orange, lemon, fig, and other semi-tropical fruits, also grow to perfection, while the facilities for irrigation enable the farmer to raise heavy crops of wheat, barley, corn, and all the vegetables.

The City of Los Angeles (formerly Pueblo de Los Angeles—City of the Angels) is situated in a narrow valley, about three fourths of a mile wide, formed on the west by low hills which extend from the Santa Monica mountains, about forty miles distant, and by the rising land of the San Gabriel plain on the east, through which the Los Angeles river winds on its way to the sea, supplying plenty of water to innumerable ditches above the town, which are used for irrigating purposes. The city, one of the oldest in the State, is about twenty-two miles from the sea shore. The old Mexican portion of it extends up the valley for nearly a mile, forming the two principal streets. The old adobe houses, with flat roofs, covered with asphaltum, or *brea*, and surrounded by broad verandahs, or high walls, are gradually being supplanted by stores and residences more suited to American ideas of domestic and commercial convenience. Many neat brick dwellings and commodious stores are to be seen in all directions. These, mingling among the old Mexican *casas*, together with the groves of orange, lemon, olive, lime, fig, pomegranate, peach, apple, and pear, with here and there a towering, feathery palm, and solid cactus fence around a field of wheat or barley, form a strange, but pleasing picture, such as can be seen nowhere outside of California. Los Angeles city contains about six thousand inhabitants, more than one half of whom are Americans, who own about three-fourths of all the land in the county, and are rapidly developing its resources. It is proposed to build a railroad from the city to Wilmington, and arrangements have been made to light Los Angeles with gas.

In this county, the semi-tropical fruits are more extensively cultivated than in any other. The following particulars relating to two of the largest orange groves near Los Angeles, will convey an idea of the proportions and nature of this branch of fruit culture. Mr. Wm. Wolfskill, one of the oldest American settlers in the county, has a grove containing 2,000 trees, which have attained an average height of twenty feet. These are about sixteen years old, planted from seedlings, there being no grafted or inoculated trees in the orchard. Their annual product averages 1,500 oranges to each tree. They generally ripen in January, and remain on the tree in a perfect condition for nearly a year, if not sooner picked. Mr. D. B. Wilson has a grove of 1,650 trees, eight years old, some of which bear as many as 4,000, but the entire number will average 1,500 oranges each.

The tuna, or gigantic fruit-bearing cactus, grows here to a very large size, frequently attaining an altitude of fifteen feet, and twenty feet in diameter. This fruit, about the size of a Bartlett pear, grows on the margin of the leaf, from thirty to forty each, and is esteemed a great luxury.

There were 6,000,000 grape vines growing in the vicinity of Los Angeles city, in 1867. The vintage of that year, throughout the county, amounted to 1,500,000 gallons of wine and 100,000 gallons brandy, in addition to which a considerable quantity of the choicest grapes were shipped to San Francisco.

Wilmington, the principal shipping-port of the county, is located on the southern side of the Los Angeles plain, on the northern extremity of San Pedro bay, twenty-two miles from the city of Los Angeles. It was founded in 1858, under the name of New San Pedro, the present name having been adopted in 1863. It now contains a large number of stores and dwellings, and about twelve hundred inhabitants. The water along the shore, being too shallow to admit ordinary sailing vessels to enter the estuary, steamers and lighters have been constructed, which carry from forty to two hundred tons to a very light draft. These are used for loading and unloading vessels at the anchorage. They come up to the wharf, and through a canal which passes into the central part of the town, where the military warehouses are located—this being the headquarters for the "Southern District of the Pacific." About a mile north of the landing, are Drum barracks, containing accommodations for ten companies of infantry, or cavalry. Wilmington, in addition to being the principal port for Los Angeles county, is also the shipping port for San Bernardino county, for the Clear Creek mining district, and a considerable part of the territory of Arizona.

A large portion of the Los Angeles plain north of Wilmington promises hereafter to be greatly benefited, for horticultural and vinicultural purposes, by means of a ditch and flume, upwards of twelve miles in length, bringing the water of the San Gabriel river to where it is required.

Anaheim is the name of a village settled by a company of German wine-growers, on a dead-level plain, about twenty-four miles east of Wilmington. The location is twelve miles from the Santiago mountains, eight miles from the sea, and three miles from the Santa Ana river.

The growth of this village, now one of the most important wine-districts in the county, is so illustrative of what may be accomplished by the well directed labors of poor men, that we give the particulars somewhat in detail, for general information.

In 1857, the site where the village stands was a barren, dry, sandy plain, similar to that extending around it, for miles, at the present time. In the summer of that year, a company of Germans, acquainted with the culture of the grape in the "faderland," purchased 1,265 acres of the plain, at $2 per acre, to test its adaptation to the raising of the vine. This land was divided into fifty rectangular lots, of twenty acres each, with streets between them. A town site was laid out in the center, with sixty building lots—one for each shareholder, and ten for public purposes. The lots were all fenced with willows, sycamores and poplars, and about ten acres of each planted with vines. A ditch, seven miles in length was cut to bring water from the Santa Ana river. The land was cultivated for two years, at the expense of the company, by hired labor. At the end of that time the lots were distributed to the shareholders. Those who were so fortunate as to obtain the best, were required to pay a certain sum to those whose lots were inferior in location, or any other quality. After all the expenses were paid, each share of twenty acres fenced, partly planted in vines two years old, with a town lot, 100 by 200 feet, cost $1,400. Each of these shares is worth a small fortune to the owner, at the present time, and will be worth a great deal more a few years hence. There are nearly

1,000,000 vines growing in this village, about 750,000 of which bear fruit. There are also 10,000 fruit-trees of various kinds, the whole place resembling a forest and flower-garden, divided into squares with fences of willow, poplar, and sycamore, which shelter the fruit from every wind. Nearly every lot contains a comfortable homestead, and the inhabitants of the village number about four hundred, There is a good public school, several stores, and a post-office in the town, but neither a lawyer, doctor, nor minister. There are hundreds of places in the southern counties where such villages might be founded, with equal or even greater advantages.

The town of San Juan Capistrano, from the old mission of that name located here, is in striking contrast to the flourishing village of Anaheim, from which it is distant about thirty miles on the main road, between Los Angeles and San Diego. The valley in which this town is situated, is about nine miles in length by something less than a mile wide. The San Juan, a never-failing stream, passing through its entire length, furnishes an abundant supply of water. The rich grasses, fine timber, and dense underbrush, that cover the whole face of the valley, afford evidence of the richness of the soil, but it is almost wholly uncultivated. The population of the town numbers about six hundred, of whom four hundred are Mexicans and native Californians, and about two hundred Indians. There are not more than half a dozen Americans or Europeans in the place; these are generally thrifty and prosperous. This is the most thoroughly Mexican town in the State, the houses being built of adobe, with low flat roofs, while the streets are laid out without much regard to regularity. The only apparent employment of the men is horse-racing, or practising with the reata. The women are rarely seen, except at the fandango or church. The children literally swarm in the streets, and are of all hues, except that of the lily; they wear little or no clothing.

The San Gabriel township, which embraces upwards of 75,000 acres of the table-lands between Los Angeles and San Bernardino, is extremely well adapted to the growth of the vine and semi-tropical fruits. There are upwards of 800,000 vines under cultivation in this township, besides thousands of orange, lemon, olive, walnut, almond, and other fruit-trees, It is estimated that there were, at the close of 1867, twenty-five thousand acres of unoccupied land in this township, suitable for cultivation, and conveniently located for irrigation.

There is another belt of country east of the above, about ten miles wide by about forty miles in length, extending into San Bernardino county, which is remarkably well adapted for the cultivation of the vine and semi-tropical fruits. It is warm, and sheltered from the cool sea-breeze; the soil is rich and deep, and could be conveniently irrigated. In this district, about twenty-four miles east from tha city of Los Angeles, connected by good roads, is the valley of San Jose—a very fine agricultural district in the foot-hills, which extends to the plains in El Chino, and into the adjoining county about twenty miles. The Puente district forms a portion of this valley, the soil of which is a red loam on the hill sides, but a nearly black, sandy clay on the bottom. It is watered by the San Gabriel and San José rivers, and by numerous tributaries that have their source among the snow-covered peaks of the Sierra Nevada. This valley produces very fine wheat and barley, as well as grapes, apples, and peaches.

A great many mulberry trees have been planted in this county during the past year, for the purpose of raising silk worms, which thrive in a climate in which the orange, lemon, and fig grow to perfection. Dr. De Witt Franklin raised both the Japanese and Chinese silk worm during 1867, and there is little room to doubt the success of the silk culture here.

Northerly from the city of Los Angeles about seventy miles, on the eastern slope of the Sierra Nevada, bordering on Kern county, there are a number of valleys and many broad, fertile cañons, equal in beauty to any portion of the State. The valley in which Fort Tejon is located is one of such. Sheltered from the hot winds of the desert by mountains four thousand to five thousand feet high, nothing can exceed it in picturesque and rural beauty. Huge old oaks cast their shadows upon the greensward, and miles of the rich foliage of the wild vine drape the banks of the stream of clear water that courses through the Cañada de las Uvas.

The first gold known to have been found in the State, was obtained, in 1833, in the valley of Santa Clara, on the western border of this county. Other gold mines of some importance have been discovered at various points in the Sierra Madre mountains, particularly on the eastern border of the county. Silver mines are in course of development in the Santa Susana mountains, about twenty miles north from San Fernando, and in the Soledad pass. Copper mines have been partially explored in the Soledad mountains and pass, about fifty miles north of Los Angeles. Near Anaheim, marble and coal are known to exist.

About seven miles west of Los Angeles there are immense deposits of petroleum and asphaltum. Over a space of twenty acres, in this locality, petroleum, of the consistency and color of coal tar, issues through a number of holes from three to eight inches in diameter, and forms pools of tar in which the gas generated at the same time creates great bladders, that burst with a loud noise. It soon hardens, on exposure, when it forms asphaltum, or *brea*, as it is called here, or maltha, as it is termed by men of science. There are a great many other places in this county where these materials are found in abundance. In the Cañada de la Brea, about twenty miles east from Los Angeles, the petroleum oozes from the hill side, and has formed immense deposits of asphaltum in the cañon. At several places around the estero of San Pedro, the same material flows through the banks near the sea beach. Considerable oil has been made from petroleum obtained in the San Fernando district. Asphaltum is shipped in large quantities to San Francisco from deposits near the coast, and experiments are being made to test its adaptability for fuel.

There are good roads in nearly all parts of Los Angeles, which connect it with the adjoining counties. With railroad facilities, and a larger population, its resources will be immensely increased.

### SANTA BARBARA COUNTY.

Santa Barbara county embraces the angle of the coast at Point Concepcion, whence it trends nearly north forty miles, and easterly one hundred and twenty miles. It is the only county in the State having so large a coast line facing towards the south. This peculiarity in its topography exerts a great influence over the climate and productions of this county, and those south and east of it. North of Point Concepcion the coast, during the summer is swept by cold fog bearing winds from the northwest, and by violent rain storms from the south during the winter. South of that point there is scarcely any fog, and it is both drier and warmer than to the north. Snow rarely falls on the highest mountains—frost is almost unknown—and it seldom rains from May to November.

The whole county, which is about one hundred and twenty miles in length, and about forty miles in average breadth, lies on the west of the main divide of the coast range. It contains about 1,500,000 acres, nearly one half of which are mountainous, and unfit for cultivation, but well adapted for cattle and sheep raising.

The Santa Inez branch of the coast mountains is entirely in this county, traversing it from east to west, terminating at Point Concepcion. The Santa Susana, and Santa Monica mountains divide it from Los Angeles county on the southeast. Between these ranges, and at their base along the coast, there are a number of exceedingly beautiful and fertile valleys, most of them being under cultivation where water can be obtained for irrigation, but no ditches or reservoirs have been made to obtain an additional supply of this element, although sufficient to irrigate the entire county runs to waste.

The Santa Inez river traverses the county from east to west upwards of one hundred miles, emptying into the Pacific Ocean at Jesus Maria, in this county. It has more the character of a creek than a river, for about ten miles from the sea. The San Buenaventura rises near the junction of the San Rafael and Santa Inez mountains, in the central part of the county, and flows nearly due south into the Santa Barbara channel, at the old Mission of San Buenaventura. The Santa Clara has its source in Los Angeles, but flows nearly west, across Santa Barbara county, entering the sea three miles southeast of San Buenaventura. The Cuyama, or Santa Maria, is quite a stream, having its source near the Cañada de las Uvas in the Sierra Nevada. It forms the northern boundary line of the county for more than one hundred miles, extending a few miles north of Point Sal to near Fort Tejon. There are a great many tributaries to each of these streams, which contain water during the year. The main river sinks into the sand in several places near its mouth. Extending east from Point Concepcion a hundred miles along the sea shore, on the south side of the Santa Inez mountains, there is a belt of land about three miles wide, the climate of which is almost tropical and unsurpassed by that of any other portion of the State.

There is but little timber in any part of the county, except oak, willow, and sycamore, which grow on the plains or in the valleys. The highest mountains being covered with grass or wild oats during the winter and spring, furnish nutritious pasturage for sheep and cattle during the entire year. In the western portion of the county, the mountains are much lower than they are on the east, where the Sierra Nevada and Coast Range unite. The culminating peak at the junction, Mount Pinos, is nearly seven thousand five hundred feet high. In this vicinity there are forests of pine and redwood.

The Santa Inez valley, in which the old mission of that name is located, is very beautiful and fertile. The old mission buildings remain in good preservation, the bells still hanging in the belfry, calling the worshippers to service. This valley, like all the others on this part of the coast, has a series of terraces formed by successive elevations of the land within the present geological era. The lowest of these three terraces, in the Santa Inez valley, is about twenty-five feet above the level of the river; the second is forty-five feet, and the third is ninety-five feet above the present level of the river, which evidently cut them all. To the west of the town of Santa Barbara, on the south side of the Santa Inez mountains, the coast line forms a terrace extending from Santa Barbara to the base of the Gaviota pass, eighty feet above the ocean.

The town of Santa Barbara is situated on the shore of the bay, on a headland to the west of which there is a good lighthouse. It is nearly in the center of the county, on the southern coast line. The houses, which are nearly all built of adobe, and roofed with red tiles, in the old Mexican style, extend continuously from the shore, for about a mile inland. It contains about 1,600 inhabitants, nearly 1,200 of whom are Mexicans and native Californians, the others being chiefly Americans and Europeans. There is one hotel and numerous stores. A good wharf has been built, but it is not far enough out from the shore for vessels to load or unload without boats. About a mile and a half from the shore, further up the valley, on an eminence which commands a fine view of the surrounding country and of a wide expanse of ocean, stands the old mission, from which the town and county derive their name. It is in a good state of preservation, service being still performed in it by the Catholic pastor. There is considerable land under cultivation in this fine valley, but little in other parts of the county. The orange, lemon, grape, olive, fig, and the cereals, are produced here.

At the hacienda of Semar del Cannello, near Montecita, about three miles east of Santa Barbara, on the sea-coast, is the largest grape-vine in the State—probably the largest on the American continent. This vine is of the old mission, or Los Angeles variety. It was planted about forty-three years ago, by Maria Marcilina Felix, a Mexican woman, who died there in 1865, at the age of 107. The vine measures nearly twelve inches in diameter at four feet from the ground; at two feet higher, the stem is divided, and its branches are supported by a rude trellis-work, forming a splendid bower, which covers an area of 10,000 square feet. It annually produces about 12,000 pounds of grapes. The bunches are generally from fifteen to eighteen inches long, and weigh from six to seven pounds each. There is a smaller vine near by, being about ten years old, that produces annually from 900 to 1,200 bunches. No fertilizer is used about these vines, excepting that the cuttings are burned, and their ashes placed in the soil over the roots. Irrigation is employed very sparingly, and only at the time when the ashes are used. No better proof of the adaptability of the soil and climate of this part of the coast for the culture of the grape can be required.

East of Santa Barbara, there is a level plain, averaging two miles wide, and about fifteen miles in length, which is nearly all in a good state of cultivation. Some of the finest barley raised in the State is produced on this plain, and most kinds of fruit are also cultivated. Monticito and Carpenteria are both located on this plain. Siticoy and Santa Clara valleys have a frontage on the coast of sixteen miles, and extend inland about forty miles, gradually narrowing, and are cultivated to some extent. These valleys and plains produce immense quantities of wild mustard, which grows to the size of small trees in some localities. Wild bees are also very numerous, yielding a great deal of honey and wax. These articles are among the staple exports of the county. A large number of mulberry trees have been planted within the past few years, for propagating the silk-worm, which is found to thrive well in this county. Its present agricultural products are of comparatively little importance, not more than 15,000 acres of land being under cultivation. The entire county contains but one grist-mill, and that with only one set of stones, about two hundred tons of flour being annually imported from San Francisco. The chief products are cattle and sheep. It is one of the most important grazing counties in the State. As recently as 1864, thousands of cattle were slaughtered for their hides and tallow, but they have increased in value two hundred per cent. since then, owing to the increasing cultivation of land in other counties. Large numbers of horses raised here are sent to Kansas, Nebraska, New Mexico, Utah, Nevada, Arizona, and Texas. Messrs. A. and T. B. Dibblee, and Col. W. W. Hollister, of San Francisco, graze 31,500 sheep upon 120,000 acres of land, near Point Concepcion. These sheep are chiefly Spanish merinos and their grades, bred with imported bucks. The wool clip from this flock, for 1867, amounted to 106,000 pounds. Hollister & Cooper, on ranchos adjoining the above have 20,000 sheep of the same character of breed. There are numerous smaller flocks in other portions of the county, and on the islands off the coast, amounting in the aggregate to 185,000. The want of population is the only impediment to the development of its resources; but it is probable that this defect will be remedied to some extent during 1868, as roads have been laid out to connect with Kern and Inyo counties.

The peculiarly mountainous character of the county renders it somewhat difficult and expensive to make good roads of any length. That which crosses the Santa Inez mountains, to Santa Barbara, is very romantic and sinuous. It winds up steep mountains by zig-zags, and crosses sandy creeks and marshy valleys, until it reaches the Gaviota pass—a natural chasm, about sixty feet wide, through a lofty chain of mountains, reaching within a mile of the sea. The sides of this pass are nearly perpendicular walls of solid rock, upwards of three hundred feet high. From this pass, the road winds at the base of these mountains, for nearly twenty miles along the sea beach. This is a delightful trip during the summer—the white-crested billows of the Pacific curling and seething about the horse's feet; and the cool sea-breeze, how refreshing—after leaving the hot and dusty roads over the mountains. But it is not quite so agreeable at night, during the winter, when the wind has lashed the waves into fury; it is then not a little dangerous to fail to make the trip between the tides.

Three miles southeast of Carpenteria, near Mount Hoar, the sea-shore is covered with a thick deposit of asphaltum, which oozes from the slaty bank in the form of thick tar, covering the beach and concreting the sand and pebbles as hard as rock, running under the sea, in places where the surface has become hardened and smooth. There are similar deposits of this mineral along the sea-shore in this and Los Angeles county, from which about two thousand tons of asphaltum are annually collected and shipped to San Francisco.

Opposite La Golita and Positas ranchos, in the roadstead of Santa Barbara, and extending coastwise as far as the "Rincon," the sea is covered with an iridescent film of oil, which finds its way to the surface at numerous points, over an extent of at least twenty miles, escaping, probably, from the outcropping edges of the strata.

There are numerous oil-springs, and petroleum deposits, in all of the southern counties.

Sulphur and salt are also obtained along the coast in Santa Barbara county; and some gold and copper have been found in the valley of the Santa Inez.

There are only three towns in the county: Santa Barbara, the county seat; San Buenaventura, thirty miles east; and Santa Inez, forty miles north-west. The population of the county is about 6,000, of whom 1,700 are children under fifteen years of age. Considerably more than one half of the adult population are Mexicans and native Californians.

### SAN LUIS OBISPO COUNTY.

San Luis Obispo county is bounded on the north by Monterey, on the east by Kern, on the south by Santa Barbara county, and on the west by the Pacific ocean. It contains about 1,500,000 acres, nearly

1,000,000 acres of which are mountainous, less than 200,000 being fit for agricultural purposes, but nearly the entire county is adapted for grazing, to which most of it is applied. Only 12,000 acres of land were under cultivation in 1867. The population of the county does not exceed 3,500, of whom nearly 1,200 are children under fifteen years of age. Three-fourths of the entire number are Mexicans and native Californians. The greater portion of the land being held by virtue of Mexican grants, in large ranchos, which are mainly devoted to cattle and sheep raising, prevents the development of the resources of the county. There are only three small towns in it, with but indifferent roads to connect them. One good stage road, from Monterey, passes through the county to Santa Barbara. San Luis Obispo, the county seat, has a population of about one thousand; San Miguel, distant forty-one miles, has one hundred and fifty inhabitants; San Simeon, thirty-seven miles northwest, has two hundred inhabitants; all the rest of the population are scattered throughout the mountains and valleys.

The valley of San Luis Obispo, on which the mission that gives name to the town and county is situated, extends in a nearly northwest and southeast direction from Estero bay to the Arroyo Grande, in the Santa Lucia mountains, a distance of nearly twenty miles, and is from three to five miles wide. The Cañadas de los Osas and de las Piedras branch from this valley—the greater portion of which is good agricultural land.

A range of mountains, which are nearly two thousand three hundred feet high on the north, but decrease to about one thousand feet where they unite with the Santa Lucia range, a little south of the Arroyo Grande, extends from the coast line and forms a wide, funnel-shaped reservoir for the sea breeze, which, passing through to the low hills further inland, materially influences the climate and vegetation of this county. The San Luis Obispo creek, which flows through a greater portion of the valley, empties into the bay below the port of San Luis Obispo. The town is situated nine miles inland in a small valley, surrounded by low hills, between the Coast Range and the sea.

The Santa Margarita valley is a broad plateau on the northeastern side of the Santa Lucia mountains, about twenty miles northeast of San Luis Obispo. This extensive plateau is nearly twelve hundred feet above the sea, and much more thickly timbered than the lower valleys. Oak, pine, manzanita, and other trees peculiar to the California Alpine regions, grow here to perfection, showing that there is more moisture in the air than in the lower districts. A branch of the Salinas river passes through this valley.

The Salinas valley is another extensive agricultural district. The main branch of the Salinas river, which has its source among the southeastern peaks of the Santa Lucia, flows through this valley for a distance of twenty-five to thirty miles, when it enters Monterey county. There is some good land along this great valley and in others which branch from it to the east and west.

On the south side of the Santa Lucia range of mountains, the temperature is more than ten degrees warmer than it is on the north. The effect of this difference is seen in the vegetation; the grasses are green and fresh on the south side for more than a month after those on the north side are dried and withered. This is due to the form of the San Luis Obispo valley, already mentioned.

The Paso Robles, is the name of a very large rancho on the eastern slope of the Santa Lucia mountains, about twenty miles north of San Luis Obispo. This rancho embraces a fine level plain containing nearly ten square miles, thickly studded with magnificent live oaks. Being quite free from underbrush, during the spring, when the grass is green, it has the appearance of a splendid park. Near the ranch house, or hotel, are the Paso Robles springs. Those nearest the house are almost scalding hot; about a mile to the north is one of icy coldness, but, like the hot ones, highly charged with sulphur. A short distance from these is a mud spring which has an aperture nearly two feet in diameter through which flows a stream of hot, thick, liquid, black, slimy mud, which is said to be effective in the cure of rheumatism. Hot mineral springs exist at several other localities in this county. There are a number of other valleys connected with the great valley of the Cuyama, extending along the southern border of the county.

With a larger population, and greater facilities for sending the products of the land to a market, the importance of this county might be materially increased. Its present exports consist of hides and wool. Cattle, horses, hogs and sheep are its staple products, but grain, fruits, and vegetables, are raised in sufficient quantities for home consumption—transportation being too expensive to send any of them to market.

In 1863, considerable excitement was created by the discovery of a deposit of cinnabar in the dividing ridge of the Santa Lucia mountains, about fifteen miles from San Simeon bay. Deposits of copper ore have been found in the Coast Range in several localities, and gold and silver have also been discovered in the mountains in the eastern portion of the county. None of the mineral resources of the county have been developed.

### KERN COUNTY.

This county was organized in 1866. It comprises portions of the Sierra Nevada, the Coast Range, the central valley between them, and of the desert-valley lying east of the Sierras, and contains nearly two thirds of the territory previously included in Tulare county. But for its somewhat inaccessible position—walled in by lofty mountains at all points, except the north—Kern would soon become one of the most important of the interior counties. It contains valuable gold mines, both quartz and placer, large deposits of salt, sulphur, petroleum and other minerals; fine timber, good agricultural lands, which are well watered by numerous streams that flow from the mountains, and a large extent of grazing country. It is bounded on the north by Tulare; east, by San Bernardino; south, by Los Angeles; and west, by San Luis Obispo. It comprises about 1,500,000 acres, nearly one half of which is adapted for agricultural and grazing purposes, although only fifteen thousand acres were under cultivation in the summer of 1867. Want of roads, distance from market, a sparse population—there being less than 3,500 in the entire county—causes farming to be less attended to than mining and sheep raising.

From Fort Tejon, on the southern extremity of the county, to the Kern river, a distance of about forty miles along the western border, the county, for about ten miles from the Coast Range, is covered with salt marshes, brine, and petroleum springs, which, in a locality more favored with roads, would be valuable.

About ten miles from the mouth of the Cañada de las Uvas, which heads near the fort, there are numerous salt springs, where considerable quantities of that mineral are manufactured. The petroleum and asphaltum deposits extend from the San Emidio cañon, on the eastern corner of Santa Barbara county, nearly forty miles to the north, to Buena Vista lake, (so named by the Spaniards in 1806,) a sheet of alkaline water about seven miles long and two miles wide. The most extensive of these deposits, is about eighteen miles south-east of the lake. At this point, there is one spring of maltha, or tarry petroleum, nearly an acre in extent, in the center of which the viscid material is constantly agitated by the escape of gas from below. Around the edge of this pool, the maltha has hardened into stony asphaltum, in which are the remains of various kinds of beasts, birds, and reptiles, whose feet had touched the sticky mass, from which they could not extricate themselves. Works were erected at this place, in 1864, to distil oil for the San Francisco market. The company made several thousand gallons of good oil, but it cost more to send it to market than oil could be procured for from the Eastern States. This long belt of oil-springs lies parallel to those on the coast line in Santa Barbara county, from which they are separated by the coast ranges.

Around the great plain which forms the center of this county, on all sides except the north, are ranges of exceedingly lofty mountains, from eight thousand to ten thousand feet high—the buttresses of the Sierra Nevada, and spurs of the Coast Range, projecting in some places nearly across the plain. There is only one pass over these mountains to the west—the Paso Robles, four thousand eight hundred feet high. On the south is the Tejon pass, five thousand two hundred and eighty-five feet above the sea level. The higher peaks of these mountains are covered with snow during the winter and spring. The subordinate ranges are well timbered with oak, pine and fir.

The San Emidio cañon, about twenty miles west of the Canada de las Uvas, which heads between Mount Pinos and Mount El Dorado, two of the highest peaks in the southern division of the Coast Range, nearly 8,000 feet high, enters this plain on the south-west. Its waters pass through a gorge nearly 2,000 feet deep, cut in beds of sand and gravel, which form terraces several miles broad on the top, showing how much the land of this portion of the coast has been elevated within the present geological era.

Nearly all of the western portion of the county is valueless, for agricultural purposes. On the south and east, the low hills, and many of the mountains, are covered with a luxuriant crop of grasses and shrubbery.

Bounding the salt plain on the east, is a spur of the Sierra Nevada called the Te-hatch-ay-pah mountains, which is nearly 8,000 feet high. The pass over these mountains is upwards of 4,000 feet above the sea level. To the east of this spur, is a fine, fertile, well-timbered valley, of the same name, about eight miles in length by three miles in width, completely surrounded by mountains from 7,000 to 8,000 feet high. It contains a small lake of extremely salt water from which quantities of fine salt are manufactured by solar evaporation—one hundred tons having been thus obtained in 1867. The stage road between Los Angeles and Owens' valley, Inyo county, passes through this beautiful place. To the north of this mountain spur, is Joe Walker's valley, named in honor of the first settler in the county, who arrived in 1835.

This valley, like that just described, is surrounded by lofty mountains. It contains about ten square miles of excellent land, which yields from forty to sixty bushels of wheat, or from fifty to sixty bushels of corn, or sixty bushels of barley to the acre. All kinds of vegetables and hardy fruits grow luxuriantly. The hills are well timbered, and there is an abundant supply of pure water. There are quite a number of such valleys in various parts of the county.

The valley of the south fork of the Kern river, about eight miles north of Havilah, the county seat, is one of the finest in the county, containing about forty square miles of exceedingly rich soil, well watered and timbered. Linn's valley, a few miles to the south, is another beautiful place for a thrifty community. About forty families have settled in this valley within the past three years, who cultivate about two thousand acres. The climate of this valley is very agreeable—scarcely ever exceeding 90° during the summer or 50° during the winter. A grist and saw mill were erected here during 1867.

The hills and rivers along the entire eastern and northern portion of the county are rich in auriferous quartz and placer gold, which give employment to nearly all the population.

Kern river, from which the county derives its name is a considerable stream that passes nearly across it from east to west, entering it near Walker's pass on the east, and emptying into Goose lake at the base of the Coast Range on the west, receiving numerous tributaries, and watering an extensive agricultural district in its progress. This fine river was called the Rio Bravo by the Mexicans. Much of the land in this section of the county is well adapted for the cultivation of cotton, and numerous experiments have demonstrated this. Several fields containing from twenty to thirty acres each were planted here in 1865, producing good crops, which were sold for full prices, for use at the Oakland Cotton Mills, but the cost of labor and transportation rendered it less profitable than other crops.

Havilah, named from a place mentioned in Genesis, where the first allusion is made to a land of gold, is the chief town in the county, and contains about eight hundred inhabitants, nearly all of whom are Americans—there being very few Mexicans and Europeans.

There are numerous mining districts in the mountains and along the creeks, near which villages have been established, and there are good roads from place to place. Considerable quantities of both placer and quartz gold are obtained, this being the most important mining county in the southern portion of the State. It contains seventeen quartz mills, and about twelve hundred of the inhabitants are engaged in mining.

Kernville is one of the most thriving towns in the county. There are upwards of a dozen important quartz ledges within a mile or two of the place, on several of which extensive mills have been in operation for two or three years—the quartz paying steadily and well.

The valleys and flats are cultivated to an extent sufficient to supply the local demand, but there is only one grist mill in the county. A large number of cattle and sheep are raised, and considerable lumber is cut. There are five saw mills in the county, capable of cutting 30,000 feet per day.

The resources of this county will not be developed until a railroad shall connect the southern counties with San Francisco, the great central market for the coast.

## COAST COUNTIES.

### MONTEREY COUNTY.

Monterey county is the southernmost of the coast counties, according to the division of the State adopted in describing its topography. It is bounded on the south by the Pacific ocean, and San Luis Obispo county, on the east by Fresno and Merced counties, on the north by Santa Clara and Santa Cruz counties, on the west by the Pacific ocean. It averages nearly eighty miles in length, by about fifty miles in width, and contains about 2,500,000 acres. Seven hundred thousand acres are good agricultural land—less than fifty thousand of which were under cultivation in the summer of 1867. The greater portion of the county is devoted to cattle and sheep raising, much of the best land being still occupied by the original Mexican grantees or their assigns.

The population, at the close of 1867, is estimated at eight thousand five hundred, of whom nearly two thousand five hundred are children under fifteen years of age. There are a large number of Mexicans and native Californians in the county, but many large ranchos have been purchased by Americans during the past few years and subdivided into farms. This has caused many of the natives and Mexicans to lose their occupation as herders and shepherds.

The prominent features in the topography of this county, are the three branches of the coast mountains, which extend through it in a northwesterly direction, nearly parallel with each other and with the coast, dividing it into three belts of valleys and two of mountains. The Santa Lucia range extends along the coast line in an almost unbroken chain of lofty hills, from Mount San Francisquito, on the south of the bay of Monterey, to Estero bay, in San Luis Obispo county, a distance of nearly one hundred and fifty miles. On the east of this range lies the great Salinas valley, and its branches. The Gavilan mountains separate this valley from the valley of San Benito and its branches, which are bounded by the main range of the coast mountains, of which Pacheco peak, in the northern corner of the county, is two thousand eight hundred and forty-five feet high—the general average of the altitude of the three ranges being from one thousand five hundred to two thousand feet. As will readily be conceived, such a configuration of the land in a section of the coast where the heavy dews and fogs from the ocean prevail during the summer, has a very beneficial influence upon vegetation. Nearly the whole of the eastern slopes is well timbered. The only pinery on the southern coast is in this county. The greater portion of the best agricultural land lies in the long valleys and table lands between these mountains. Most of the soil in the uplands is sandy or gravelly, but produces large crops of the cereals or fruits, when irrigated. The mountains, in a wide district on the northwestern side of the county, are of granite formation, which is very unusual in the coast range. This has a material influence on the soil of that section.

The Salinas river, after flowing through San Luis Obispo county, enters Monterey a few miles south of the old mission of San Miguel, nearly in the center of the southern border of the county, meanders through the Salinas valley for about ninety miles, and empties into the bay of Monterey, forming a navigable river for a short distance.

The San Benito river rises among the mountains near the Panoche Grande, one of the culminating peaks of the Coast Range, nearly in the center of the eastern border of the county, and flows for about sixty miles to the northwest, where it unites with the Pajaro, at the southern extremity of Santa Clara county.

The Pajaro river separates this county from Santa Cruz, and Santa Clara counties, and flows about forty miles in a westerly direction, until it enters Monterey bay.

The Carmel is an inconsiderable stream, which drains the hilly country north and east of the northern termination of the Santa Lucia mountains, and empties into Carmel bay. These are all the rivers of any importance in the county.

Among the most important of its valleys, are the Pajaro, which extends from the shore of the bay of Monterey to the foot of the Gavilan mountains, about ten miles, ranging from six to eight miles in width, and divided nearly in the center by the Pajaro river. This valley contains about ninety-six square miles, only one half of which is in this county. This land is exceedingly fertile, and almost level. On either side of it, for several miles, there is a range of low, smoothly rounded hills, well watered by numerous creeks, and but little less fertile than the bottom-land, which produces fine crops of wild oats, bunch grass, and a variety of clover and native grasses, where not under cultivation. The grape, peach, apple, wheat, corn, barley, and all the hardy fruits, grain and vegetables, thrive remarkably well in this soil. The black soil of the Pajaro has become famous for the wheat and potatoes it produces. The fogs and dews from the ocean are almost equal to rain, on the crops in this valley. Nearly the whole of this section has been settled by American and European farmers, and is in a high state of cultivation. Well tilled farms occupy the site of many an old cattle-rancho, and, in place of the solitary old adobe *casa*, the valley is now dotted with cheerful rural villages, school-houses and churches. Surrounded by the three great branches of the Coast Range; the foot-hills, covered with fleecy flocks and herds of cattle; the lower ranges, thickly timbered with live oak, redwood, pine, and the beautiful madroña; the culminating peaks, brown, bleak and bare—the whole forms a delightful scene of agricultural thrift and prosperity. This beautiful valley was wholly uncultivated prior to 1850.

The Salinas plains extend south-east from the boundaries of the Pajaro valley. They cover an area of nearly 1,500 square miles, and contain many thousand acres of excellent grazing land. At present, most of it is covered by Spanish or Mexican grants, in large bodies, and is used for sheep and cattle ranges.

This county, in 1860, contained more sheep than any other county in the United States—and 100,000 cattle. They are not as numerous at present, but the breeds have been greatly improved, and the value more than doubled. The wool-clip for 1867, exceeded 350,000 pounds. There are few counties as well adapted for sheep-raising as Monterey county. The yearly increase of the flocks is from ninety to one hundred and ten per cent. No disease is known. The hills in the Coast Range afford pasturage, in seasons when the plains and valleys suffer from drought. At the close of 1867 there were 300,000 sheep in Monterey county, the most of which were of imported, or of improved breeds.

The valley of San Juan lies to the east of the San Benito, a spur of the Gavilan mountains, twelve miles east of Watsonville. It contains about twenty-five square miles of good bottom land, with a large tract of grassy hills adjoining. On the southeast side, on an elevation of about fifty feet, overlooking the whole valley, stands the old mission of San Juan Bautista.

Carmel valley, on the extreme northwest, about three miles from the town of Monterey, and the San Antonio valley on the south, both sites of old missions, are famous for fruits. Figs, grapes, peaches, olives, etc., are cultivated, as well as the cereals.

The town of Monterey, the county seat, derives its name from Gaspar de Zunniga, Count de Monte Rey, given by Viscayno, the discoverer of the bay, in 1603. It is situated in a little nook of the mountains, on the southern shore of the bay, near its western extremity. Like all other Mexican towns, the streets are irregular, and most of the houses are built of adobes, over which, in this place, the most charming flowers grow from the ground to the roof—almost every house being surrounded by a garden. The beautiful Monterey cypress, (*cupressus macrocarpus,*) a favorite ornamental tree, is peculiar to this locality. It has not been found in any other part of the State, except where transplanted. On the eastern slope of the hills, the California laurel (*oreodaphne Californica*) and the madrone, (*arbutus menziesii,*) are large and numerous.

Pajaro, twenty miles north; Natividad, twenty-five miles northeast; San Juan, thirty-one miles northeasterly; Salinas, sixteen miles east; and San Antonio, seventy-five miles southeast; are each considerable towns, containing from one hundred to nine hundred inhabitants. There are good roads connecting these towns with Monterey. When the projected railroad between Watsonville, an important town in Santa Cruz county, situated on the Pajaro river, and San José, in Santa Clara county, shall be completed, and Monterey county is connected with San Francisco by iron bonds, much of the land now used for grazing will become too valuable for that purpose, and will be converted into grain fields, for which most of it is well adapted. Watsonville is about fifty miles from San José, and one hundred miles from San Francisco.

At present, Monterey county exports a large quantity of butter and cheese, grain, fruits and vegetables. Quite an important source of wealth to the county are the whale and other fisheries in the bay, and along the coast. Large quantities of pure white sand is shipped from the bay for the glass works at San Francisco, and for sprinkling the imitation stone buildings in that city. Monterey, also contains veins of gold and silver bearing quartz, of copper, lead and quicksilver ores, of asphaltum, marble, and of numerous minerals of commercial value, which will probably pay for development when transportation shall be more convenient, and labor less expensive than at present.

## SANTA CRUZ COUNTY.

Santa Cruz county is situated on the northern side of the bay of Monterey. It is one of the smallest counties in the State, but second in the importance of its manufactures, only to San Francisco. In outline, it is long and narrow, being about fifty miles in length, by from eight to thirteen miles wide. Its coast-line measures about fifty miles. The whole of the county lies between the summits of the Santa Cruz or Gavilan mountains and the sea. It is one of the most mountainous of the coast counties. Within an area of about 500 square miles, or 320,000 acres, it contains 40,000 acres of the richest bottom lands along the valleys of the various streams that pass through it, and 50,000 acres of fine agricultural land, which form the terraced plateaus, caused by the repeated uprisings of the land. These plateaus extend along the coast, the entire length of the county, and reach inland to the limits of the timber. This raised land varies in fertility, but is generally productive. The greater portion of the county—230,000 acres—consists of mountain ranges, much of which is adapted to grazing, and a large proportion is densely timbered with magnificent forests of redwood, oak, and pine.

This county is bounded on the north by San Mateo county; on the south, by the bay and county of Monterey; on the east, by Santa Clara county; and on the west, by the Pacific ocean. Its population, nearly all of whom are Americans, chiefly from the New England States, numbers about 11,000. In 1860, there were less than 5,000. Most of the best land in the county was originally covered by Spanish and Mexican grants, but these have been purchased by men of means, and subdivided into farms, which is the main cause of the rapid development of its resources.

The county is watered by several never-failing streams, which run from the mountains to the ocean. They are all short, with considerable fall, creating power sufficient for an almost unlimited number of water-wheels, to drive machinery. The chief of these rivers are the San Lorenzo, which passes through the county nearly in its center and empties into the bay of Monterey, near the town of Santa Cruz; the Soquel, which enters the bay three miles further south; the Aptos; the Sulsipuedes; and, still further south, the Pajaro, (bird,) passing between this and Monterey counties; and the Pescadero. The climate of this county is remarkably varied—places but a few miles apart differ as much in temperature and productions, as does the north from the south of France. Where sheltered from the sea-breeze, the rose and many other flowers are perpetually in bloom. All the grain and fruits which grow in other parts of the State, except the orange, olive, fig, etc., flourish here. The vine, however, does not thrive at points below an elevation of seven hundred feet above the sea.

The town of Santa Cruz, the county seat, is situated on the north side of Monterey bay, in a pleasant little nook or bend, formed by a spur of the coast range which projects about two miles into the bay. It is surrounded with high mountains on all sides except the southeast; on this side it is open to the bay, along which there is a stretch of beautiful, pearly white sea-beach. The view from the upper portion of the town, looking south, is magnificent: the waters of the capacious bay, nearly thirty miles wide, are pale blue where deepest, and shade into snowy whiteness as they approach the smooth sand. The town of Monterey, nestled in a similar nook on the opposite shore, looks like a huge flower-garden, the green foliage contrasting finely with the grey granite of the hills that enclose it, while the brown mountains, crested with a dark forest-ridge, form a bold, beautiful border. To the right is the wide expanse of the Pacific ocean stretching to the limits of the horizon, its surface smooth and bright as a mirror, or ruffled into billows by the winds—still grand, under either aspect.

The town is built on lands formerly owned by the old mission of Santa Cruz, (Holy Cross,) founded in 1791, which gives name to the county. Near the ruins of this old building, a handsome Catholic church has been erected. It is Mexican in origin, but has been reconstructed by its American possessors. Only a few of the old adobe buildings remain, and, until quite recently, a double row of beautiful willows, which once formed the fence of the old mission garden, was growing in the center of the main street, but the march of improvement, and the expansion of the town, have caused the destruction of nearly all of them. There are good wharf accommodations, but the harbor is exposed to all winds except the north, which renders it dangerous for vessels during the winter; it is, however, the best harbor in the county.

The site of the town furnishes a notable illustration of the several elevations to which this portion of the coast has been subjected, during a comparatively recent period. It consists of three benches, which are from a mile to two miles wide, and extend through the valley. The first is thirty feet above the level of high water, the second is thirty-four feet higher, and the third is one hundred and ninety-nine feet still higher, showing a total rise of two hundred and sixty-three feet. The business portion of the town, and most of the gardens and orchards, are on the lowest of these terraces. The old mission, and the tanneries, which form an important interest here, are located on the middle bench. The lime-kilns and several dwellings are on the upper one, from which a railroad to connect with the wharf from this point, is projected. The entire bones of a whale were found, about two years since, on the upper level, near the banks of the Soquel.

Opposite Santa Cruz, on the southern side of the San Lorenzo river, are the ruins of the old Mexican pueblo of Branciforte, which was originated as a substitute for the pueblo of San Francisco. During the past year, nearly one hundred new buildings, chiefly private residences, have been erected in the town, and gas-works have also been constructed.

The San Lorenzo valley, in which this town is located, is about twenty miles in length, running north-west and south-east, in several places narrowing to a mere channel for the river, between high hills; at others, opening into wide plateaus, which are very valuable for agricultural purposes. In this county, the chain of mountains which divides it from Santa Clara is called the Santa Cruz mountains, while that extending to the westward, and forming the blunt peninsula that projects on the south into the bay of Monterey, and on the north into Half-Moon bay, is called the Coast mountains. The head of this valley is only seven miles from the beautiful Santa Clara valley, but the whole of this distance is very mountainous and densely timbered with redwood. Shielded from the unpleasant winds which occasionally blow from the ocean, with a soil almost to the top of the mountains of exceeding richness, and a stream of pure water running through its entire length, capable of turning a large number of mill-wheels, it is not wonderful that it has become the seat of a busy agricultural and manufacturing population.

Pescadero is a flourishing town, about thirty-five miles north-west from Santa Cruz, and only fifty miles from San Francisco. It is located on both sides of Pescadero creek, near its confluence with the Butano, about a mile from the sea-beach. The New San Francisco Water Company will take their supply from the head of the former creek. The valley in which this charming place is situated, contains about 4,500 acres of extremely fertile land, surrounded by high hills on all sides except the west, to which it opens to the broad expanse of the Pacific ocean. An idea of the quality of the soil in this valley may be formed when it is stated that a large crop of potatoes has been raised on some portions of it, for twelve consecutive years, without manuring.

The famous pebble beach is near this town, where agates, opals, jaspers, carnelians, and other silicious stones, of almost every conceivable variety of color, are found in great abundance, polished with a fine lustre by the smooth sea sand, and the ceaseless motion of the surf. These pebbles are of all sizes, the most beautiful ranging from the size of a pea to a marble, and are of every imaginable shape. Some are as transparent as glass, others only partially so, but marked with variegated bands of red, white, green, and blue. The most abundant are of the various tints of red peculiar to carnelians; occasionally opals are found, as round and nearly as lustrous as pearls—some few are black as jet, others clear amber colored, or pink, like amethysts. Some stones of commercial value are found here; probably as many as twenty tons are collected annually for ornamenting walks, and many are cut, and set in jewelry. The source from whence they are derived is a stratum of coarse, friable sandstone, which skirts the coast for about two miles along the beach. It is only in this vicinity that they are found. Innumerable pebbles are imbedded in this sandstone, in as highly polished a condition as those found on the beach, having doubtless been washed on a similar beach for ages before the present one was formed by the uplifting of the land.

Pescadero contains one of the most enterprising communities in this progressive county. Its residents have built handsome churches, school houses, public buildings, hotels, bridges, wharves and private residences, equal to any town in the State of the same size. The lower hills around the valley afford excellent grazing for large herds of cows, from the milk of which this little town annually makes and exports to San Francisco one hundred and seventy-five thousand pounds of cheese, and fifty thousand pounds of butter, both of good quality. The immense "Sanitary cheese," weighing four thousand pounds, five feet six inches in diameter, and twenty-two inches thick, made for the benefit of the "Sanitary Fund," in 1863, which realized several thousand dollars by its exhibition and sale, was made in this little valley. The exports of oak bark, collected from the forests in the higher ranges, furnish another important source of revenue to the place. The lumber business, fairly commenced only a year or two since, has expanded into large proportions, the mountains and cañons being covered with forests of redwood and pine. Pescadero is a favorite resort of pleasure seekers from San Francisco, from which it is only six hours drive over good roads. The scenery and climate in the vicinity are among the finest on the coast. Barley and potatoes are the principal crops raised—from sixty to eighty bushels of the former, and two hundred and fifty 100-lb sacks of the latter to the acre being not an unusual yield.

For several miles south of Pescadero the coast line presents a bold outline of cliffs, formed of sand, gravel and clay, nearly two hundred feet high, the remains of the old terraces so often referred to, worn by the beating of the waves into little coves and gulches, fringed in many places with a luxuriant growth of shrubs and flowers. There are also several valleys in this vicinity, in which villages have been located, saw mills erected, and the soil cultivated to a considerable extent.

Five miles south from Pescadero is Pigeon Point, so named from having been the scene of the disastrous wreck of the ship *Carrier Pigeon*, several years since. This is both a whaling station and a flourishing agricultural district, but labors under great disadvantages for lack of a landing place—this part of the coast being very dangerous, and almost inaccessible. Yankee ingenuity, however, surmounts these difficulties, and the place thrives. During 1867 it exported 6,200 sacks of oats; 3,000 sacks of potatoes; 120,000 pounds of butter; 10,500 of cheese; 12,500,000 shingles and nine hundred barrels of whale oil; besides large quantities of other produce—the whole of which was shipped in the following manner: The surf breaking nearly six hundred feet from the line of cliffs which skirts the shore, no boats can land, or wharf be built; a hawser is therefore made fast to the rocks beyond the breakers, and to stout posts in the cliff above, at an angle of about thirty degrees. On this hawser are large blocks and tackles, to which the articles for shipment are attached and lowered into boats ready to receive them. These boats convey them to the vessels, which are compelled to anchor nearly a mile off the shore. Of course, this work cannot be carried on except in fair weather.

Franklin Point, three miles south of Pigeon Point, is another dangerous projection from the coast line. This place is named from the wreck of the *Sir John Franklin.* The *Cora*, from Australia, was also wrecked here in 1866. The graves of the crews, and some of the passengers of both vessels, are near the beach.

Four miles south from Point Franklin, is New Years Point, where there is a break in the coast line, and a small indentation affords a harbor for quite a fleet of vessels engaged in the lumber trade. Here, a wharf, seven hundred feet in length, has been constructed on piles, sufficiently high to be above the surf, which occasionally breaks with great fury. Upwards of two million feet of lumber are annually shipped from this wharf. Waddell's mills, an extensive lumbering establishment, five miles distant, among the redwoods, are connected with this wharf by a railroad.

Watsonville, one of the most thrifty towns in this county, is situated on the north bank of the Pajaro river, where the road to Monterey crosses it. It is five miles from the bay of Monterey, and about twenty miles southeast from Santa Cruz. It was founded in 1853, by J. H. Watson. At present it contains a number of hotels, large stores and factories, several churches and school houses, numerous brick and frame private dwellings, and is the center of considerable trade, having a good shipping port about three miles distant, on the Salinas river, at Elkhorn slough, the Estero de Vallejo of the old Californians. This slough, which is about two hundred and fifty feet wide, has such a circuitous course to the bay that it is nearly ten miles in length, while the distance in a straight line is only four miles.

The climate of this place differs materially from that of Santa Cruz, being located at the mouth of Pajaro gap, in the Gavilan mountains, which causes it to be frequently shrouded in a dense fog, when Santa Cruz is enjoying the clearest sunshine.

Corallitas, about six miles north from Watsonville, is the center of another important section of the county. The town of the district, which contains nearly one thousand five hundred inhabitants, is situated in a small valley, through which the Corallitas creek flows on its way to the Pajaro. This stream rises to the north between the Loma Prieto, (black mountain,) three thousand feet high, and Mount Bache, three thousand seven hundred and eighty feet high, (the two highest peaks in this section of the Coast Range,) and after meandering in a very serpentine course for about twelve miles through a country densely timbered with redwood and oak, unites with the Pajaro about a mile north of the town of Watsonville. There are a great number of saw mills and several flouring mills on this creek, which affords the only water power in the southern portion of the county. Nearly one hundred thousand acres of land in this district were sold during 1867, in parcels of forty to two hundred and fifty acres, for farming purposes, at prices ranging from three to thirty dollars per acre.

Soquel is another growing locality. The town of this district is situated on the west side of the Soquel creek, about a mile from the bay of Monterey, and three miles easterly from Santa Cruz. This place was settled in 1845, by John Hames and John Daubinbiss,. who reside here still. This creek also rises among the Black mountains, but at some distance from the Corallitas, and after winding among the thick timber for eighteen miles, enters the bay about three miles east of Santa Cruz, where a good wharf has been erected.

Castroville is another town which has been formed within a year or two, on the rancho of Rafael Castro, at the mouth of Aptos creek, about two miles east of Soquel landing, where a wharf five hundred feet in length has been built, from which a large quantity of grain, potatoes, and lumber is shipped to San Francisco. In October, 1867, there were four thousand cords of wood at this wharf awaiting shipment.

There are few scenes more strikingly Californian or more naturally beautiful than may be met with during a ramble through the redwoods of Santa Cruz. The peculiar and delicate cinnamon tint of the bark of these superb trees, which not unfrequently measure fifteen feet in diameter, towering from two hundred to three hundred feet in height, and sometimes straight and free from branches more than half of that distance, the dark green foliage, resting above as a huge canopy, impervious to the sun's rays, keeps the soil cool and moist, and forms a sort of hot-house for numerous varieties of delicate flowers, while in the less sheltered cañons, the magnificent madroña, the laurel, manzinita, sycamore, buckeye and birch, and the numberless varieties of underbrush, all varying in tint and form, comprise a picture of rare beauty. For its luxuriant vegetation and sturdy growth of timber, as well as its genial climate, Santa Cruz is indebted to its position, which fully exposes it to the moist and tempering breezes of the ocean.

About ten miles northeast from the town of Santa Cruz there are forty-five cylinders of sandstone, which were at one time supposed to be the ruins of an old building. These curious pillars are from forty to fifty feet in length, and from one to three feet in diameter, and hollow through their entire length. They rest, at their base, on a stratum of sandstone, but pass through a bed of loose sand. They have been formed by mineral springs containing lime and iron in solution, which, in their passage to the surface, deposited these minerals in the sand, concreting it into these cylinders. When the land was uplifted, and the source of the springs dried up, the sand, being exposed to the wind, was removed, leaving the pillars standing, until some of them fell from want of support. They form an interesting object in the topography of the county.

Among the valuable natural products of this county may be mentioned the chestnut oak, (*quercus densiflora,*) which grows abundantly in the mountain ranges. The bark of this tree contains more tannic acid than any other that grows on the American continent. It is this peculiarity that causes the California leather to be so much tougher than most other kinds. There are at present seven tanneries in Santa Cruz, which consume monthly about three hundred tons of this bark, in making 55,000 sides of sole, upper and harness leather annually, valued at $225,000, about sixty per cent. of which is sole leather. The best portion of the trees, after the bark has been removed, is converted into staves for flour and lime barrels, of which a large number are made annually; the balance of the tree is cut into fire-wood, of which several thousand cords are annually sent to San Francisco. The peculiarly rich soil of the lower hills produces a great quantity of hazel bushes, from which nearly all the hoops used by the powder-works and lime-burners are made. The powder company use 1,700,000, and the lime-works over 300,000, of these hoops annually, and large quantities are also exported to other places, without any apparent decrease in the supply of the material. These hoop poles sell at from $5 to $10 per thousand when split, and give employment to a large number of laborers. This adaptation of materials to appropriate purposes is illustrative of the spirit of the people who inhabit this county. There are many other sections of the State quite as rich in natural resources, and as conveniently located with reference to markets as Santa Cruz, but they are not inhabited by so enterprising a population.

The number of fish swarming in Monterey bay, is almost incredible. There is scarcely any description known on the coast, from the whale to the sardine, but is caught here. In 1863, an immense shoal of herrings, from some unknown cause, was stranded along the beach, on the Santa Cruz side of the bay. They extended for nearly three miles, and were spread to the depth of from six inches to nearly two feet over the entire beach. A whaling station does a profitable business here; occasionally a leviathan enters the bay, when the peculiarly transparent water allows him to be seen for miles floundering and battling with the swarms of parasites that feast on his blubber, until he is captured by the whalers. The sardines in this bay are more numerous and of better quality than are caught in many portions of the Mediterranean, of which thousands of dollars' worth are annually imported into the United States.

Copper ore exists in the Chelone and San Benito districts, near the center of the county.

Oil from petroleum has been made, to some extent, on the Seyente rancho, a few miles above the town of Santa Cruz, on the San Lorenzo river. There are several other localities in the county where petroleum is abundant.

Coal has been discovered about seven miles from Watsonville, on the Santa Cruz road, near the Seven Mile house, and at Lewis' valley, in the eastern portion of the county. There has been but little effort made to develope these discoveries.

Lime is one of the staple products of this county. More than one third of all the lime used at San Francisco—about 220,000 barrels, annually—is brought from Santa Cruz, where it is made from a large body of highly crystalline limestone found about two miles north-east of the town.

Gold, in both quartz veins and alluvium, has been discovered in several places in this county. In 1854, a boulder of auriferous quartz was found on Graham's ranch, which contained nearly $27,000 in gold. Quite an extensive mining district was located in the vicinity of this discovery, and small quantities of gold and silver were obtained from both quartz ledges and placers; but mining not paying as well as other pursuits, it was abandoned.

In 1863, some excitement was created by the discovery of gold in the sand on the beach of Monterey bay, between Aptos landing and the Pajaro river. This gold was in exceedingly fine scales, somewhat similar to that found nearly four hundred miles further north at Gold Bluff, in Klamath county. Being difficult to save, and not yielding much to the pan, it did not pay to work. Gold has also been found in nearly all the gulches in the vicinity of the town of Santa Cruz.

The sand along the coast in this county, formed by the erosion of the peculiar, white granite, so abundant in the vicinity of the bay, is remarkably well adapted for the manufacture of glass. Large quantities are collected and shipped to San Francisco, for this purpose. About eight miles north from the town of Santa Cruz, at the base of the Gavilan mountains, is an immense deposit of this white sand, which may be of considerable value when the manufacture of glass shall be more extensive in the State than at present. This sand contains a large proportion of glassy feldspar, in the composition of which there is upwards of twelve per cent. of soda—an important ingredient in the manufacture of glass.

The soil of the valleys of this county is very well adapted for the cultivation of leguminous plants, and a large proportion of the beans raised in the State is the product of these valleys. Flax also grows with great luxuriance. The table lands, where not cultivated, produce enormous crops of wild mustard, the seed of which is so much superior to that raised further south or north, that it sells for more than any other kind.

The crops in this county have never failed through drought. Its peculiar topography attracts so much fog and dew as to sustain vegetation in the absence of rain.

There are eight grist mills in this county, which made, in 1867, 28,000 barrels of flour; twenty-two lumber mills—twelve steam, and ten driven by water—capable of sawing 11,000,000 feet per annum; also, nine shingle mills, which make over 12,000,000 shingles, annually. Among other important manufactures are gunpowder and paper. The California Powder Works—the pioneer powder mill in the State—was incorporated in December, 1861, and commenced the manufacture of powder in May, 1864, with a capacity of two hundred and fifty kegs per day. In May, 1867, its capacity was increased to over six hundred and forty kegs per day, chiefly blasting powder, and during the nine months ending December 31st, of that year, 158,500 kegs, containing twenty-five pounds each, were manufactured.

The San Lorenzo Paper mill made, in 1866, thirty-one thousand reams of straw paper, from straw grown in the vicinity, and about six thousand five hundred reams of newspaper. Owing to the flood of 1866–67, operations were suspended from January to June of the latter year. During the seven months ending December 31st, 1867, over thirty thousand reams of wrapping paper were made.

The manufactures of this county derived an important advantage from the great earthquake of 1865. That shaking increased the waters of all the creeks and rivers to nearly double their previous volume, during the dry season.

## SANTA CLARA COUNTY.

This county is bounded on the north by Alameda and San Mateo counties, on the south by Monterey, on the east by Stanislaus, and on the west by Santa Cruz county. It is about thirty-five miles in length by thirty miles in average width, and contains over 1,050 square miles, or nearly 700,000 acres, of which about 300,000 acres are valley—the balance is low grassy hills, or heavily timbered mountains. The greater portion of this land is enclosed—large tracts in the mountains being fenced for their timber; about 300,000 acres are under actual cultivation, this being one of the most important agricultural counties in the State.

The increase in the assessed value of real estate in the county during the year 1866 exceeded $850,000, and from the large number of new settlers and the additional land under cultivation during the past year, the increased valuation for the year 1867 will probably reach $1,000,000 above that of 1866, making the aggregate assessed value of the real property amount to $6,000,000. This is far below the actual value. It contains a population of twenty-three thousand, of whom seven thousand are under fifteen years of age. The county derives its name from the old Mission of Santa Clara, founded in 1777. The present mission buildings were not erected until 1822, and these are not on the site of the original mission. Two previous structures were destroyed, one by a flood in 1779, the other by an earthquake in 1781.

Santa Clara county is not well watered naturally. So large a portion of it being in the great valley, it has but few streams. The Guadalupe and Coyote creeks are the only water courses of any importance within its limits. These have their sources in the southern part of the county, and, after flowing some twenty miles among the mountains on the east, approach San José, and then empty into San Francisco bay, near Alviso. An abundant supply of water is obtained by means of artesian wells, of which there are nearly one thousand in the valley—its geological formation being exceedingly favorable for boring. All the orchards and gardens about San José and Santa Clara are watered by this means. In 1856, one of these wells, in the vicinity of San José, was bored to the depth of three hundred and twenty-five feet, when the water rose in a solid stream, through a seven inch pipe, to the height of thirty-two feet above the surface. The great increase in the number of wells since that time has materially lessened the flow, and but few of them now force the water above the surface. Prior to 1860, the mammoth fountains these wells formed in nearly every garden and farm were among the attractions of San José. The flow of water was so great that ditches had to be cut to carry off the surplus. Few of the wells are more than one hundred feet deep.

The broad valley of Santa Clara, at the southern extremity of San Francisco bay, twenty miles wide, and extending upwards of thirty miles southward, is charmingly undulated with gently rounded hills, and beautifully diversified with clumps of oak and numberless farms, gardens, cottages, towns, and villages.

The peculiar geographical position of this county, in a broad valley nearly surrounded by mountains, causes it to enjoy an equable climate; but it is from ten to fifteen degrees warmer than that of San Francisco, being comparatively free from the cold winds and fogs which prevail nearer the coast. The greater portion of the soil on the lower plains is a rich black, sandless loam, called "adobe," which yields from twenty-five to thirty bushels of wheat to the acre. Many fields have been planted with grain for ten consecutive years without manuring—

the last crop being the heaviest. This is particularly the case on what is known as Stockton's ranch, a large tract of land on the east side of the valley, purchased by Commodore Stockton in 1847. There are other sections where the land thus continually "cropped" with wheat, on which the yield is much lighter than formerly. Some of the new land yields as high as seventy-five bushels of wheat to the acre. The wheat raised in the eastern portion of the valley, where the soil is somewhat gravelly, sells for the highest price in the San Francisco market, and makes the finest flour.

Along Los Gatos creek, about a mile from San José, there is a tract of rich bottom land which, a few years since, was covered with willows, but now contains about thirty acres of hops, which it produces luxuriantly. The crop at this place, for 1867, was estimated at thirty-five thousand pounds. About the town of Santa Clara—the highest land in the valley—the soil is lighter and more sandy; similar land extends beyond Gilroy, thirty miles south of San José, but it is not generally cultivated, as it does not prove remunerative to haul produce to market by teams from that point. When the railroad to Watsonville is constructed, many thousands of acres in this district will be cultivated, which are now used for grazing. One reason why much of the hill and mountain land on the west side of Santa Clara valley, about Gilroy, and south of that place, is retained for grazing purposes, is, that being within the range of the fogs from the ocean, the grass is green, and affords good pasturage during the summer. Every year, large numbers of stock are driven from some of the southern and interior counties to be fed on the fresh pasturage of these hills. So valuable are some of these lands for this purpose, that their owners hold them at higher prices than the grain lands of the valleys.

The high lands bounding the valley on the east and west are admirably adapted for the cultivation of the grape, to which large tracts have been applied. The soil of these hills is a dark brown, sandy loam, quite unlike that of the valley. The common California grape, which does not ripen until September in other localities, on the hills southeast of San José, ripens in July and August. The highest ridges of the mountains are in many places densely timbered, affording a supply of good lumber and fuel. The slopes around the edge of the valley are covered with wild oats and native grasses, and afford excellent pasturage for large herds of cows. The butter and cheese made about Gilroy are famous for their richness. There are very few cattle raised in the county, it being so generally under cultivation with grain and fruit.

From San José to Gilroy, a distance of nearly thirty miles, the valley in the summer forms an almost unbroken wheat field. In May, June, and July, when the grain is ripening, the view of this portion of the valley is a marvel of beauty. The farmer's houses, surrounded by gardens and orchards, appear like beautiful green islands in a golden sea. A month later, the whole scene is changed ; the waving grain has all been cut, and huge stacks of yellow straw and dingy grain bags are piled up in all directions, the latter waiting to be hauled to market. In the spring it presents still another aspect, when the young grain is just peeping above the black soil, and the purple and white blossoms of the apricot and peach form a striking contrast in color with the hazy neutral tint of the distant mountains.

The great extent of level land in this valley admits of the use of all descriptions of agricultural machinery; the consequence is that nearly all the work on the large farms is performed with almost incredible rapidity. A thousand acres are sometimes plowed, seeded, and cut in less time than is required on farms of one hundred acres in many parts of Europe. This advantage, together with the much larger yield per acre, compensates for the higher price of land, labor and material. Large tracts of this valley produce volunteer crops, which are cut for hay, yielding generally about two tons per acre.

There are about forty steam threshing machines, and a large number run by horse-power, in this county; also, ten first-class grist-mills capable of turning out 1,600 barrels of flour daily; and ten saw-mills, with power adequate to cut 70,000 feet of lumber per day. There are seven tanneries—three at San José, three at Santa Clara, and one near McCartysville—which, in the aggregate, make from 12,000 to 13,000 sides of leather annually.

San José, the county seat, is situated near the Guadalupe river, about nine miles from the head of San Francisco bay, fifty miles from the city of San Francisco. It is an old Spanish pueblo, founded in 1777, the first founded by that government in this State, but presents none of the features of such an origin except a few adobe houses on the plaza, and the row of willows which form the alameda between it and Santa Clara, two miles distant. This unique grove, one of the finest drives in the State, was planted by the missionaries, in 1799, as a walk to connect the pueblo of San José with the mission church, near where it now stands, at Santa Clara. San José is the center of an important agricultural district, the development of the resources of which has been greatly augmented by the construction of the San Francisco and San José railroad, completed in 1863. Nearly one half of its principal buildings has been erected since that time, and its population, importance, and the value of real estate, have more than doubled. In 1860, it had but 3,000 inhabitants; at present, it has upwards of 7,000, including the suburbs. Land in the vicinity of the alameda, which a year or two since could have been purchased for $50 per acre, now sells at from $200 to $300 per acre. Six important stage-lines radiate from this place, in connection with the railroad; and the long line of farmers' wagons and heavy teams, the whirr of the stages, the whistling and bell-ringing of the locomotives, the rattle of machinery, the throng of people, and general activity, all tell of thrift and progress.

It contains many fine public buildings, stores and private residences, including six churches, and several colleges and public schools, a fine park planted with trees and rare plants, and has more of a metropolitan appearance than any other town in the State, except San Francisco and Sacramento. The court-house, in the northern part of the city, is the finest structure of the kind in the State. It is constructed of stone, brick, and iron, in the Corinthian style; is 100 feet in width, 140 feet in length, and 56 feet high to the top of the cornice, above which a dome, 50 feet in diameter, rises 59 feet higher. The front is an hexastyle portico, 76 feet high and 15 feet deep, reached by a flight of 13 solid granite steps. The six Corinthian columns, 4 feet in diameter and 38 feet high, support an elegant entablature 10 feet high. The exterior walls are ornamented with pillastres, to correspond with the front; the interior is fitted up with equal taste and elegance. The main court-room is 48 by 68 feet, and 38 feet high, lighted from the ceiling by 12 highly enriched panels of ground glass. The total cost of the building exceeded $150,000. At certain seasons of the year, the view from the dome of this building is one of the most charming and suggestive to be found in the State. The valley at this point, nearly fifteen miles wide, is a perfect net-work of fences; the whole of it, as far as the eye can range, being under thorough cultivation, each parcel of land differing in tint, according to the crop and the stage of its growth. For miles around the building, as a foreground, are solid masses of orchards and nursery gardens, thickly planted with fruit-trees and flowering plants, for San José has always been the nursery garden of the State, where exotics are acclimatized. Here may be seen the strange but beautiful shrubs and flowers from Japan and China, the gum and acacia trees from Australia, the geranium and fuschia from the south of Europe, the rose, box and holly from England, the blackthorn from Ireland, the lily from France, the pink and carnation from Germany, the tulip from Holland, the currant and fig from Greece, the olive and grape from Italy and Portugal, the glorious magnolia and camelia japonica from the "sunny south," and the sturdy pine from the cold north—all blooming and growing in the genial open air, beside the cactus and palm, the cypress, cedar and sequoia, and other beautiful indigenous trees and plants of the Pacific coast, forming a variety of foliage not to be seen outside of California, and a sort of floral representation of the cosmopolitan character of the population of the State. In some of the vineyards of this place, as many as 120 varieties of grapes, from all parts of the world, are cultivated successfully. The pear grows here in extraordinary luxuriance and beauty—many of the older trees producing from 3,500 to 4,000 pounds each season. Few of these trees were planted prior to 1852. There are 5,000 cherry trees in the gardens of San José, cultivated to supply the San Francisco market, besides a large number in private orchards. The average product of seven-eighths of these trees is one hundred and fifty pounds of cherries each.

The Hon. J. E. Brown, who owns a vineyard near San José, has introduced the cultivation of the raisin-grape, (*fager zagos,*) which thrives remarkably well. One stem, in the summer of 1867, yielded between thirty and forty pounds of this fruit, in fine bunches, as a first crop for that year, and was loaded in November with nearly as many more. The climate of this valley is well adapted for drying all kinds of fruit. The success of Mr. Brown's experiment, has induced several other parties to cultivate the raisin-grape here; Santa Clara will consequently produce in a few years large quantities of raisins.

The first silk-worms raised in the State were hatched at this place. They were obtained from Adrianople, (Turkey,) by Messrs. Prevost & Hentsch. Several attempts were previously made to introduce the worm from Europe, but without success. More expeditious means of transportation have, however, since enabled the European worms to be introduced. There are also worms from China and other parts of the world, all of which appear to thrive. Large mulberry orchards, cultivated to feed the silk-worm, are raised here, and a factory is to be established for the manufacture of silk. The business of silk-making may yet become an important interest at this point.

A portion of the Western Pacific railroad, extending north from San José into Alameda county, has been completed a distance of twenty miles, but has not been brought into use. The proposed Southern Pacific railroad is to start at San José, and run through the entire county, southeasterly.

Santa Clara is situated on a slight eminence, about two miles north-west from San José, to which it is united by the alameda, rapidly becoming a continuous street between the two places. The University of the Pacific is located near this alameda. Santa Clara contains five churches and several excellent schools. The old mission which gives name to the county, forms a portion of the present Jesuit college. The olive trees and vineyards of the old establishment are in an excellent state of preservation. From this place, looking north, may be seen the dim outline of the mountains beyond San Francisco, with the city, bay, and shipping, at their feet; to the east, the Monte Diablo ranges, with their shady nooks and gently sloping sides, form a border to the valley; west and south, are the mountains of the coast, and a little west of south, the extensive works of the New Almaden quicksilver mine are distinctly seen.

Gilroy, named after an early settler in the State, about thirty miles south-east from San José, is a flourishing town situated between the Coast Range and the Contra Costa mountains, in the southern part of the Santa Clara valley. It contains four churches, a school-house, and many well built stores and residences. Old Gilroy resides at San Ysedro, about three miles from the town, in the same old adobe house built forty years ago. North-east of the town, along the sloping edges of the plateau which forms the center of the great Santa Clara valley, is the grazing district of this county. Here, thousands of sleek cows find abundant pasturage, which imparts to their milk such richness as to cause the butter and cheese from this locality to be among the best that reaches the San Francisco market. The mountains six miles west afford an abundant supply of lumber and fuel. The proposed railroad from San José to Watsonville, will pass through this place.

About six miles easterly from Gilroy, is the Cañon de los Osas, (Bear's cañon,) which, a few years ago, was a favorite resort of the "grizzly." It is a wild but exquisitely beautiful gorge, through a range of high mountains, covered with live oak, sycamore, and a dense underbrush, which is still full of small game; but "bruin" has been exterminated. The red clover and bunch grass growing luxuriantly here, are the favorite food of many kinds of game. The creeks and pools are also full of fine trout.

About fourteen miles from the town, in a small rocky ravine, on the Coyote cañon, near the headwaters of that creek, where the mountains, timbered to their summits, rise several hundred feet on both sides of that creek, a Mexican shepherd, while hunting for some of his stray flock, in 1865, discovered what are now the well known Gilroy springs. The hot spring, represented as possessing remarkable medicinal qualities, discharges continuously about three inches of water of a nearly uniform temperature of 110° Fahrenheit, at all seasons. This water contains in solution, iron, soda, magnesia, sulphur and baryta, and a large quantity of it is bottled and sold in San Francisco. It is by no means unpleasant, but pungent to the taste. Within fifteen feet of this hot spring there are a dozen or more large springs of pure, cold water. The beauty of the surrounding scenery, and the curative qualities of the waters, have caused the erection of a fine hotel on the edge of the cañon, to reach which a good road has been made from Gilroy.

Lexington, twelve miles southwest from San José, is situated in a gap in the Sierra Azul, as the Santa Cruz mountains are here called, in a beautiful amphitheater of densely timbered mountains nearly two thousand feet high, that surround it on all sides. There are extensive tracts of good farming and grazing lands in these mountains. In the plateaus formed by the rising of the land, the grape, apple, peach and other fruits, as well as all the cereals, grow remarkably well. There are a number of good orchards, and upwards of one thousand acres of cultivated land in this district, which invariably produce fine crops. Six of the largest lumber mills in the county are located here. Los Gatos creek, passing through it, furnishes abundant water power. This is also one of the most noted sections of the State for split lumber, such as posts, rails, and pickets. The timber here splits with a peculiar smoothness and straightness. Upwards of one million feet of this description of lumber are annually shipped from Lexington.

McCartysville, ten miles southwest from San José, is situated at the foot of the Coast Range, in a pleasant valley nearly surrounded by mountains, some of which are more than three thousand feet high, from which flows Campbell's creek, a considerable stream of water, giving adequate water powerfor a number of lumber and grist mills located on it —lumber and grain being staple products of the district. Farming, stock raising, and the cultivation of fruit, are also carried on successfully. The remarkable increase in the supply of water in the San Lorenzo river, after the earthquake of 1865, referred to in the topography of Santa Cruz county, extended to this place, which is nearly twenty miles north from that river. The water in Campbell's creek was doubled in volume, greatly to the advantage of the millers and lumbermen.

One mile above, and northwest of McCartysville, on Campbell's creek, are situated the Pacific Congress springs, so called because of the resemblance of the waters to those of Congress spring, one of the fountains at Saratoga, New York. There are at this place three of these springs, the two lower but four feet apart, the third being separated from them by a space of about fifty feet. They are but a foot or two deep, being excavated from the sandstone, the lower one, which receives the drainage of the others, sending off a stream about two inches in size. The water from these several springs is so nearly alike that the difference can scarcely be perceived by the taste. By analysis it is shown to contain 335.85 grains of solid matter to the gallon, composed as follows:

| | |
|---|---|
| Chloride of sodium | 119.159 |
| Sulphate of soda | 12.140 |
| Carbonate of soda | 123.351 |
| Carbonate of iron | 14.030 |
| Carbonate of lime | 17.295 |
| Silica alumina, with a trace of magnesia | 49.882 |

It is considered a healthful and refreshing beverage, and though but recently introduced, is fast gaining favor with the public, about eighty dozen bottles being sent away daily, besides considerable quantities consumed by guests visiting the springs. The gas is collected in a receiver placed over the principal fountain of the group, whence it is conducted through a pipe and forced into the bottles.

Alviso, the shipping port of Santa Clara county, is located at the junction of the Alviso slough and the Guadalupe river, about three miles from the bay of San Francisco, and eight miles north of San José. There are good wharves at this place for the accommodation of shipping, and a number of flour mills, granaries, and stores. The Alviso brand of flour is one of the best in the State.

New Almaden is situated about thirteen miles southerly from San José, on the Alamitos creek, in a narrow glen, nearly five hundred feet above tide level, between high ranges of mountains, Mount Chisnantuck, the culminating peak on one side being nearly one thousand eight hundred feet high, and Mount Umunhum, on the other, nearly one thousand five hundred feet in height. This place was located in 1845, by Don Andres Castillero, the original discoverer of the New Almaden quicksilver mines, which are situated in the mountains on the southwest of the town, and nearly nine hundred feet above it; but the deposits of cinnabar extend for several miles along the range. The town of New Almaden contains about one thousand eight hundred inhabitants, nearly all of whom are either employed about the mines and works, or in ministering to the wants of those who are.

The Enriquita mine is two miles northwest from the Almaden, and the Guadalupe two miles still further north. The details pertaining to these mines are given in another chapter, devoted to the subject of "Quicksilver."

Another town connected with a quicksilver mine has sprung up within the past year, about three and a half miles south from San José, on Chapman's ranch. The developments in the Bautista mine, located here, are such as to warrant the belief that the discovery is of some importance. Furnaces, several stores, and private residences have been built at this place within a few months.

There are excellent roads throughout the county, mainly connected with San José, but more are needed for the proper development of its resources.

In addition to the important deposits of cinnabar in this county, it also contains several veins of copper ore, which have been worked to some extent. Petroleum and asphaltum are abundant in the range of mountains between Gilroy and Watsonville, particularly on Sargent's ranch, and in Moody's gulch, near Lexington, at a point one thousand one hundred feet above the sea. A number of wells were sunk here in 1865, and small quantities of oil were obtained.

### SAN MATEO COUNTY.

This county embraces nearly the whole of the peninsula of San Francisco, which separates the bay from the Pacific ocean. It is over thirty miles in length, six miles wide on the north where it joins the county of San Francisco; nearly sixteen miles wide in its center, and ten miles wide on the south, adjoining Santa Cruz county. It was organized in 1856, when it was separated from San Francisco, to which county it formerly belonged. It contains 154,980 acres, 140,000 of which are enclosed, 62,000 being under cultivation. A branch of the Gavilan, or Santa Cruz mountains, here called the Sierra Moreno, traverses it from north to south, reaching an altitude in some places, of 3,000 feet, averaging about 1,500 feet, forming two slopes, the eastern one shedding its waters into the bay of San Francisco, and the western into the Pacific ocean. These mountains, in the southern part of the county, are steep and rugged, but covered with redwood and oak.

A bench, from two to five miles wide, which skirts the bay of San Francisco, and another about a mile wide and ten miles long, near Half Moon bay, caused by the uplifting of the land, are among the most valuable portions of the county, for agricultural purposes. This land is exceedingly fertile, and produces fine crops of the cereals, but small tracts in the mountains, and many charming little valleys among them, are also under cultivation, in which grow luxuriantly, fruits, vegetables and grain. Much of the mountain land is also used for grazing purposes; many large herds of cows are kept here, which supply some of the best milk consumed in San Francisco.

The excellence of the climate, which is milder and less humid than that of San Francisco, and the accessibility of that city, have caused this county to be thickly settled for homestead purposes. Here a large number of the wealthy citizens of the metropolis have erected private residences, around which, all that money, taste, and skill, can accomplish in the way of adding to the natural beauty of the scenery, has been done. Few counties in the State contain a greater number of elegant private mansions and gardens, than San Mateo. The San Francisco and San José railroad, passing through it for nearly twenty miles, has greatly tended to increase the number of this class of residents, and materially aided in developing the resources of the county.

Its population, at the close of 1867, numbered 6,000; in 1863, it contained only 3,250. The value of its real estate and productions, has increased in a still greater proportion since the completion of the railroad.

San Mateo is one of the dairy counties of California, much attention being paid to this business. The facilities for feeding the stock; the heavy fogs from the ocean condensing on the slopes of the hills, keeping the pasturage green for months after the grass is withered in the valleys, and the convenience to San Francisco, afford many advantages to dairymen. There are fifteen dairies in this county, which, collectively, have five thousand cows.

The county contains two water, and three steam saw-mills, of sufficient power to saw 35,000 feet of lumber daily; three shingle-mills, with capacity for cutting 75,000 per day; and two grist-mills, capable of making 200 barrels of flour daily. Its chief resources are grain and lumber.

Redwood city, the county seat, about twenty-eight miles south from San Francisco, is situated on the edge of a broad plain, extending from an estuary of the bay of San Francisco, through which passes Redwood creek, navigable a short distance for schooners, drawing seven feet of water. This plain is but little above the level of high tide, large patches of it being a salt marsh. It gradually rises as it approaches the mountains, most of it being under cultivation. The city, which was founded in 1851, contains many good stores and private, as well as public, buildings; several churches and schools, and about eight hundred inhabitants. It is the chief shipping place for the county; considerable quantities of redwood, lumber, firewood, grain, flour, fruit and vegetables, milk, butter, cheese, and other produce, are sent from here to the San Francisco market.

Half Moon bay, about twenty miles north-west from Redwood city, on the opposite side of the peninsula, is the shipping port for that portion of the county.

There are several other towns and villages in this county, the chief employment of the inhabitants of which is farming and lumbering.

The Cañada del Reymundo, situated nearly in the center of the county, enclosed between lofty mountains, is one of the most beautiful places in the coast-range—about six miles in length, by about two miles wide, the surrounding mountains covered nearly to their summits with live oak, madroña, bay, laurel, maple and young redwood; the lower hills with buckeye, elder, willow, and alder; every level spot a grain field, garden, orchard, or grassy meadow, with cottages peeping out of nooks and corners; while the running water from numerous springs, and the music of swarms of birds that nestle in the thick underbrush, all combine to form a scene so secluded and peculiarly rural, that it is not possible to conceive anything more in contrast with the dust and turmoil of San Francisco, only two hours' ride distant. The whole of this charming glen was included in a grant made by the Mexican Government, to John Coppinger, one of the early settlers; but it has since been subdivided among a number of persons, and now forms one of the most important farming and stock-raising districts in the county.

San Andreas valley, near the headwaters of the San Mateo creek, which gives name to the county, is a similar, but somewhat smaller valley.

Crystal Springs, where a number of springs of clear, cold water break through the rocks in a beautiful cañon, is one of the resorts of the people of San Francisco. The roads are good, and the scenery fine in the vicinity.

The greater portion of the water used for domestic purposes in San Francisco, is obtained from Pillarcitos creek, in this county, whence it is conveyed by means of iron pipes a distance of twenty miles. The Spring Valley Water company have constructed extensive works in the Pillarcitos cañon for the purpose of collecting and distributing this water. Their dam has formed a beautiful lake, two miles in length by about one thousand feet in average width, which is surrounded by precipitous hills, combining to make it one of the most attractive spots within so convenient a distance from San Francisco. This dam crosses the cañon at a point where it makes a short curve, is five hundred and forty feet long on the top, and three hundred feet at bottom; four hundred and fifty feet thick at base, and twenty feet thick at a height of ninety-six feet; the water within it being of an average depth of fifty feet, but nearly one hundred feet in some places. The quantity thus collected amounts to about 1,300,000,000 gallons—sufficient to supply the city for two years at the present rate of consumption, if no rain were to fall during that time. This large body of water is six hundred and thirty feet above the level of Montgomery street, so that by mere pressure the supply can be extended over any portion of the city. The geological formation of the mountains in the vicinity of this lake being chiefly granite, limestone, and indurated slate, the water is generally clear, but to insure the utmost purity, it is passed through beds of gravel, sand and charcoal, before distribution.

The Corte Madera Water company's works are located in the foot hills, about seven miles west of Redwood City, where they collect the waters of Bear gulch, a branch of the San Francisquito. Their reservoir holds 30,000,000 gallons of water, and supplies Redwood City and Menlo Park.

In minerals, San Mateo is one of the poorest counties in the State. In July, 1863, a vein of auriferous quartz was discovered in the San Andreas valley, and gold and silver have been found in small quantities at other places. Sulphur, and sulphur springs, are known to exist in several localities, and coal has also been found near the Mountain Home mill, and at other points on both slopes of the mountains.

### SAN FRANCISCO COUNTY.

As a separate chapter will be devoted to the history and resources of this county, its topography is omitted from the division of coast counties.

### ALAMEDA COUNTY.

Alameda county forms the eastern shore of San Francisco bay, for about thirty-six miles, running in a north-westerly and south-easterly direction, and extends from the bay, on the west, to the summit of the Monte Diablo range, a distance of nearly thirty-five miles. It contains about 800 square miles, or 512,000 acres, nearly equally divided between mountains, valleys, and plains. Nearly 175,000 acres are enclosed, and 125,000 under cultivation. About 20,000 acres along the margin of the bay, are overflowed by the tide.

The Contra Costa and Monte Diablo ranges of the coast mountains, cross this county from north to south, running nearly parallel, and separated by a few miles, the former being the more westerly. Numerous spurs from each project, at various angles, forming a series of beautiful and fertile valleys, all connected with each other, but having different names where thus partially separated by these spurs. Among the most important of these valleys, are Livermore, Suñol, Castro, Amador, and Morago. The plains embrace the nearly level land stretching along the shore of the bay, from Alviso to San Pablo, a distance of forty miles. This strip lies between the bay of San Francisco and the foothills to the east, and has an average width of about five miles. These valleys and plains are mostly covered with a rich, loamy soil, much of which is under a high state of cultivation, and produces abundantly.

The principal stream in this county, and from which it derives its name, is the Alameda creek. It rises in the Monte Diablo range, near Livermore pass, and running through a cañon in the Contra Costa mountains, near the old mission of San José, empties into San Francisco bay, near Unionville, supplying water-power for several grist and other mills on the way. The San Lorenzo, San Leandro, San Antonio, and Temescal creeks, rise in the Contra Costa mountains and flow into the bay, through the Alameda plains. There are several navigable sloughs running through the overflowed lands and connecting with these streams. Near the north end of the county is San Antonio creek, on the north shore of which is situated the city of Oakland. At the mouth of San Leandro creek, is the bay of San Leandro, on which the town of Alameda is located. Extensive wharves and piers have been erected at these places, and the bars obstructing the channels leading to them have been deepened and improved, so that vessels of considerable burden can arrive and depart at any stage of the tide.

There are several low passes through both the mountain ranges—Livermore, on the north, through the Monte Diablo range, thirty miles from the bay, being only six hundred and eighty-eight feet high; the Western Pacific railroad will be built through this pass. Corral Hollow pass, in the same range, lies ten miles south of Livermore's. These low passes, the long stretches of level land, with the proximity of Alameda county to San Francisco, secure to it great advantages.

The San Francisco and Alameda railroad, opened August, 1865, commences at Woodstock, on the slough at the mouth of San Leandro creek where a wharf projects some distance into the bay, and extends to Hayward's, sixteen and a half miles south-east, among the foothills of the Contra Costa mountains. It runs through a fine level country, cultivated almost every foot of the way, and has numerous stations connected with cross-roads, by means of which the products of a wide extent of country are rapidly transported to San Francisco. This road will connect with the Western Pacific, at Washington Corners, thirteen miles south of Hayward's.

The Oakland and San Francisco railroad, opened in April, 1863, begins on a pier, extending 3,500 feet into the bay of San Francisco, opposite the city of Oakland, and runs to San Antonio, five miles, and is soon to be extended, to form a junction with the Alameda road. The distance from San Francisco to the western terminus of this line, is four and a third miles, but arrangements are in progress to extend the wharf toward Goat (Yerba Buena) island, about three-fourths of a mile beyond the present terminus. When this work shall be completed, the distance to be traversed by boats will not exceed three miles and three quarters. At present, it requires forty-five minutes to cross from San Francisco to Oakland. The boats running on these routes are capacious and swift, and arrive and depart nearly every hour in the day.

With the exception of a belt of evergreen-oak, *quercus agrifolia*, which margins the bay, and gives name to the several encinals (encinal being the Spanish word for an oak grove), a few groves of deciduous oak, *quercus sonomensis*, and a small number of redwood trees in the mountains south of Suñol valley and east of Fruitvale, the county is at present poorly timbered. It was in a much better condition, in this respect, a few years ago. The redwood at one time grew to an enormous size in the mountains about five miles east from San Antonio. The remains of a forest of these trees exist at this place, which is about half a mile wide, and extends down the eastern slope of the mountains about two miles. Here grew hundreds of the largest trees that have been found in the Coast Range. One stump still remaining in tolerable preservation, measures thirty-two feet in diameter. Nearly every tree in this once noble forest, has been cut down and converted into lumber, but the ground is thickly covered with vigorous saplings, which, in a few years, may form another fine forest, as this tree grows with great rapidity.

The soil of the plains in this county is generally a rich, black, sandy loam, from six to fifteen feet deep, resting on a substratum of sand and gravel, and is sufficiently moist to grow any description of fruit, grain, or vegetables, without irrigation. The soil on the foot-hills and mountains is somewhat lighter in color, not so deep, but gravelly and dry, and everywhere fertile.

With so fine a soil and climate, and with so many facilities and inducements for its cultivation, the greater portion of this county, adjacent to the bay of San Francisco, has been converted into continuous gardens, orchards, and grain-fields; but much of the best land in the south-eastern part of the county, east of the Contra Costa mountains, including portions of the Amador and Suñol valleys, is but partially cultivated, for want of the cheap and expeditious transportation supplied by railroads.

Thirteen miles south-east from Oakland, on the northern bank of the San Lorenzo creek, is the garden from which Oregon obtained its best apple, and other fruit-trees. In 1846, Mr. John Lewelling, the pioneer nurseryman of the Pacific coast, took a wagon-load of fruit-trees raised here, into that State, which were among the first ever planted there. In this vicinity are several other extensive nursery and seed gardens, the soil and climate being peculiarly well fitted for horticultural purposes. Here, Mr. Daniel L. Perkins raised the hundred and thirty varieties of vegetable seeds exhibited at the Paris Exposition, in 1867, for which he obtained a premium, and, what proved more profitable, numerous orders for supplies from the Atlantic States, France, England, Germany, Russia, China, Japan, and several other countries. The products of this gentleman's little patch, of about twelve acres, thus spreading over the three great continents, is singularly suggestive of the silent but effective influence the productions of California are exerting abroad.

To illustrate the richness of the soil in this locality, and the proportions of the vegetables raised here, we mention the following facts: A beet raised in Mr. Lewelling's garden, weighed 200 lbs.; in 1867, Mr. R. S. Farelly raised a carrot which measured 36 inches in length and 31 inches in circumference, weighing 31 pounds after the leaves were cut off. These mammoth proportions are not confined to the vegetables raised here, but extend to fruits, flowers, and berries. Cherries of the Graffan variety, grown in Lewelling's orchard, in 1867, were selling in the streets of San Francisco, which measured three inches in circumference; pears raised here frequently weigh three and a half pounds; strawberries, which are extensively cultivated, also grow to an extraordinary size. Mr. Pancoast, who in 1867 cultivated a patch of eighty acres, raised many berries weighing from one and a quarter to one and a half ounces each. Mr. A. Lusk has a field of raspberries in this vicinity, containing upwards of eighty-five acres, which produces enormous quantities of this delicious fruit, and there are several other quite extensive strawberry, raspberry, and blackberry patches—all of which are more particularly referred to under the head of "Fruits." The above are merely mentioned in this place with a view to illustrate the extreme richness of the soil in this locality.

Amador valley, formerly the valley of San José, where the padres of that old mission pastured their cattle, is now the great grain district of this county. It is of a triangular form, about eight miles in diameter, and nearly surrounded by low, grassy hills, being spurs of the Monte Diablo and Contra Costa ranges. Its soil is a moist, sandy loam, producing good crops of wheat, barley, and corn, when less favored districts suffer from drought. Where not under cultivation, its surface is covered with thick crops of wild oats and bur clover, the most nutritious of all the native grasses. Less than ten years since, this valley was a cattle-ranch—20,000 cattle, 15,000 sheep, and 3,000 horses finding abundant pasturage in the vicinity. But it is all fenced in now, and no cattle except milch cows, working oxen, and horses, graze on the surrounding hills.

The increase in the value of land in this valley, since it has been brought under cultivation, and its productiveness ascertained, has been very considerable. In October, 1867, 3,000 acres of the Rancho el Valle de San José (at the lower end of it) were purchased for $70,000; two years previously the purchaser had declined the same property when offered for $13,500.

In Livermore valley are located some of the largest grain fields in the State. In 1867 Richard Threlfall cropped here 4,000 acres, all embraced in one field that averaged 24 bushels to the acre; some portions as much as 40 bushels averaging 62 lbs. per bushel. On the eastern side of this field, where the rays of the sun reached the grain in the early morning, while the dew remained upon it, it appeared almost solid enough to walk upon. The tall straw, nearly four feet high, was perfectly straight, and the compact growth of the ears rendered it impossible for the heavier to droop. When threshed, almost every grain in the immense field was of the same size, and color, pale and plump, as good California wheat always is. This grain farm gives employment to 60 men, 140 horses and mules; uses three herders, five reaping machines, and two steam threshers. In the ploughing season, eighty acres are ploughed, sowed, and harrowed, daily.

In reference to the products of this valley, the yield above stated, although quite large, as compared with that usually obtained in other countries, is not quite up to the average in this locality, such large fields not being as well managed as smaller ones. On the Santa Rita ranch adjoining, 100 acres yielded 75 bushels per acre; a field of 60 acres, in the same valley, producing 80 bushels to the acre.

Connected with the Amador valley, are two smaller valleys—the Alamo and Tasajera, both equally fertile. The whole of these valleys, and a considerable tract lying adjacent, were included in the rancho once owned by José Amador, whose name it now bears. This individual also gives name to Amador county, as will be explained when describing that county. Amador, in 1850, sold this property to Americans for a trifle. In 1866, one of his sons obtained a precarious living as a squatter among the hills that surround the valley in which he was born, and which, during the past three years, under American enterprise and energy, has produced upwards of a million dollars' worth of grain.

Oakland, the most thrifty and important town in Alameda county, contains about 6,000 inhabitants. It is located in what was once a fine grove of 1,500 acres of evergreen oaks—the Encinal de Temescal of the native Californians—directly opposite San Francisco, from which it is distant seven miles. In appearance, the California evergreen oak resembles a large apple-tree, so that the city, looking as if built in a huge orchard, bears a charming contrast to the treeless streets of San Francisco. Scarcely any town in the State has made greater progress, during the past three years, than Oakland; the value of its real estate and the number of its inhabitants having nearly doubled within that time. Although not laid out as a town till 1851, it contains many elegant and substantial public and private buildings, has well paved streets; is lighted with gas, and is in a fair way of being amply supplied in a short time with good water. The excellence of the climate, the beauty of the surrounding scenery, and its proximity to San Francisco, have induced many doing business in that city to build their homes in the groves of Oakland, or among the hills around it. The College of California and other public, as well as several private educational institutions, are located here. The sons and daughters of the well-to-do citizens from all parts of the State and from Nevada, as well as many youth of both sexes from Mexico, the Sandwich islands, and several pupils from Japan, are educated here.

The State asylum for the deaf and dumb, and blind, is situated near Oakland. This useful institution has been erected on a gently sloping eminence in the lower foothills of the Contra Costa mountains, commanding a splendid view of San Francisco bay and its surroundings. The proportions of the building are 192 feet front by 148 feet in depth. It is three stories and a half high, being 62 feet to the gables and 145 to the top of the tower. Its exterior walls are built of a fine, bluish granite, found in the vicinity; the interior work being of brick.

The style is what may be termed domestic gothic, with high, steep roof, large mullioned and transomed windows, tower and buttress-angles of cut stone; a handsome porch, of the same material, adorns the center of the main front, all the interior fittings being of the most improved style for such establishments. Everything that Christian charity, and a generous liberality could accomplish towards alleviating the afflictions of its unfortunate inmates, has been attended to. The building and its furniture, when complete, will cost the State upwards of $175,000.

Among other improvements in progress at Oakland, are the extension of the wharf, from the main land towards Yerba Buena island, a distance of three fourths of a mile; and the erection of the new State Mining and Agricultural College.

Brooklyn, a thriving town, comprising the localities known as Clinton and San Antonio, separated from Oakland by San Antonio creek, is rapidly increasing in importance as a manufacturing center. In addition to the cotton factory located there, this is also the site of one of the largest shoe factories on the coast, as well as of a tannery, pottery, and last factory, which, collectively, give employment to a large number of men and women.

Factories, like some kinds of animals and plants, appear to be gregarious, thriving best when considerable numbers are congregated in the same locality. There is scarcely an instance, on this coast, where a factory of any kind has been successfully established, but that it has been soon after followed by one or more others at the same place. This curious fact should operate to encourage every community to aid in establishing these industrial institutions in their midst.

The mill of the Oakland Cotton Manufacturing Company, is a two-story brick structure, 90 by 45 feet, with two wings 20 by 30 feet each. It contains 35 looms, and the necessary machinery for a first-class establishment. It is driven by a 45 horse-power steam-engine, and gives employment to about 100 persons, men and women, engaged in weaving or in making up into clothing and other articles, the tweeds, cassimers, and cotton-cloth produced. The first piece of cotton-cloth woven in the State, was made here in September, 1865. Since then, the works have been kept steadily in operation, turning out about fifty thousand yards per month, chiefly 4–4 cotton for flour-bags, and sheeting for the Mexican market. In November, 1867, considerable improvements, with an enlargement of the works, were commenced, for the purpose of manufacturing bagging material, of which upwards of $1,200,000 worth is annually imported and made into grain and flour sacks, at various points in the State. A little of the cotton used at this mill, is of California growth. Details, touching its cultivation in this State, will be found elsewhere in these pages.

Fruitvale, situated about one and a half miles south-east of Brooklyn, in a charming little valley nestled among the foothills of the Contra Costa mountains, is, as its name implies, a noted place for fruit, nearly all kinds of which grow there with little labor, and of rare excellence. A number of the business men of San Francisco have their homes in or about Fruitvale.

Alameda, a town two miles south of Oakland, is situated upon a peninsula nearly two miles wide, called the Encinal de San Antonio, lying between the San Lorenzo and San Antonia creeks. It was laid off as a town in 1852, and is now a thrifty place, containing many good buildings and about 1,200 inhabitants.

San Leandro, the county seat of Alameda county, a pleasant rural town, with several substantial public, and many handsome private buildings, is situated near the San Leandro creek, about seven miles south of Oakland, on the edge of a fertile and well cultivated plain, the surrounding country being a succession of gardens and orchards, and grain-fields. It contains about five hundred inhabitants.

Hayward's, six miles south-easterly from San Leandro, is a new and rapidly improving town. It owes much of its importance to the fact of its being connected with the bay of San Francisco, by the Alameda railroad, rendering it the shipping point for an extensive agricultural district. Here is stored, ready for transportation, the grain produced over an area of forty or fifty square miles. To accommodate this business, a number of large warehouses have been erected at this place. In 1865, a brick granary, 223 feet long, 50 feet wide, and 20 feet high, was built here ; but, it being found inadequate for the increasing crops, another was added to it during the year 1867, 306 feet long, 60 feet in width, and 25 feet high. The two have been found insufficient to hold the products of the district at certain seasons when the railroad is unable to carry away all that offers for transportation.

At this place is also located the chief cattle-market of the State—the property of an incorporate company styled the "Butchers', Drovers', and Stockraisers' Association," organized in January, 1866. In that year, 11,928 animals were sold here, valued at $182,600. In 1867, the number of animals sold exceeded 20,000, valued at $500,000.

Alvarado, a thriving village of several hundred inhabitants, is located about ten miles south from San Leandro, on the banks of Alameda creek. It stands about five miles from the bay of San Francisco, being in the district of swamped and overflowed land already mentioned. The chief occupation of the inhabitants of this place is the collection of salt, which forms in large quantities on the land overflowed by the waters of the bay. There are eighteen companies engaged in this business, whose works extend nearly twelve miles along the eastern shore of the bay, and afford employment to some one hundred and fifty men. The quantity of salt annually collected exceeds 10,000 tons, of the average value of $8 per ton. The whole of it is collected and purified by solar evaporation. The salt-water is retained in reservoirs, during high tides, and evaporated in shallow ponds ranging in size from twenty to five hundred acres. Some of these salt-ponds—formed mostly of earth—are located in swamps, which, though a few years since deemed absolutely worthless, are now valued at from four to ten dollars per acre; and, since the demand for salt is likely to extend as the fisheries on this coast increase, the value of these lands will no doubt continue to appreciate.

The old mission of San José is situated in the southern part of this county. It occupies a handsome valley among the lower foothills of the Contra Costa range, facing the bay. A hamlet has sprung up around the old mission buildings, which being in good repair, are still used as a Catholic church. The old gardens and orchards are among the best in the district, a pear-orchard, planted by the missionaries, producing a large crop of fruit annually. About two miles from the old mission of San José, near the banks of the Agua Caliente (hot water) creek, in the midst of a beautiful grove of oak and other trees, are the Alameda warm springs. The fine climate and pleasant surroundings of the place, with its ready accessibility, render it one of the most popular resorts in the neighborhood of San Francisco. To the east, Mission peak, the culminating point of the Contra Costa mountains, attains a height of 2,275 feet, presenting with its angular outlines, its grassy sides, and patches of shrubbery, a grand background to the intervening landscape. From the peak, a fine view is obtained of San José, Oakland, and of the city and bay of San Francisco. The hotel arrangements, and the attention guests receive here, are highly spoken of by visitors, who are numerous during the summer season. The waters are medicinal, containing sulphur, lime, magnesia, and iron, in various proportions.

Alameda county contains large quarries of granite, limestone and sandstone, suitable for building purposes. The quarry from which the stone used in erecting the Deaf and Dumb and Blind Asylum was obtained, is situated on Pryal's ranch, about four miles from Oakland.

The supply of this stone is exhaustless. A quarry of close-grained, greyish sandstone, has recently been opened about four miles from Hayward's. Nearly all the brown sandstone used in San Francisco, is obtained from quarries in this vicinity.

In 1864, Mr. A. D. Pryal, owner of a large ranch about four miles east from Oakland, discovered a vein of auriferous quartz in the Contra Costa hills, which cross his lands. Some of the specimens from this vein were rich in free gold, and the mine opened under the name of Temescal, paid well for a short time, but the dislocation of the strata, a little below the surface, rendered its further working unprofitable.

In 1862 and 1863, several small deposits of argentiferous galena, and other silver ores, were discovered in the Mocho and Valle Arroyos, among the spurs of the Monte Diablo and Contra Costa mountains.

In 1856, extensive outcroppings of coal were found at Corral hollow, in this county, about thirty miles east from Oakland, and several attempts since then have been made to develop a number of veins in this vicinity. Prior to 1860, about five hundred tons of coal were sent to market; and in 1862, some shipments were also made, chiefly from the O'Brien mine. In 1867, a new company was organized, and the requisite machinery erected here, for the thorough development of what is supposed to be an extensive deposit of this mineral.

Petroleum has been found at several points on the western slope of the Monte Diablo range.

Alameda county contains seven grist-mills, capable of making 1,200 barrels of flour daily; but, having no timber fit for lumber, it is without saw-mills—its chief sources of wealth being its grain, fruit, and dairy products.

### CONTRA COSTA COUNTY.

This county derives its name from the central range of the coast-mountains, which cover a considerable portion of its surface. It is about forty miles in length, from east to west, and twenty miles wide, from north to south; but its outlines are very irregular, being bounded on the north by San Pablo and Suisun bays, and the San Joaquin river; on the east, by the western channel of that river; on the south, by Alameda county, and on the west, by the bay of San Francisco. It contains upwards of 500,000 acres, about 150,000 of which are good arable land, nearly 100,000 acres being under cultivation. This land lies chiefly in the numerous small valleys scattered through the Contra Costa and Monte Diablo ranges of mountains, which cross the county in a northerly and southerly direction. There are 100,000 acres of swamp and overflowed lands in this county, situated about the margins of Suisun bay and along the banks of the San Joaquin river, much of it being reclaimable. Portions of it, brought under cultivation, have been found to produce good crops of grain, fruit, and vegetables, without irrigation. There is a sweep of this *tule* land in the north-east corner of the county, of upwards of 75,000 acres subject to overflow during wet seasons, which, if protected by a levee, would become one of the most valuable agricultural sections of the county. Mountains and hills cover about 250,000 acres, including Monte Diablo, which contains the most important coal-mines in the State.

San Ramon, the finest valley in the county, is a continuation of Amador valley, described in the topography of Alameda county. It is equally fertile throughout, and extends quite across the county under different names; the upper portion extending a distance of ten miles, where it unites with the Amador valley, is called San Ramon valley, and the lower portion, through which Pacheco creek runs, is called Pacheco valley. On the east side of this lower valley, and opening into it, is the Diablo valley, extending to the base of Monte Diablo. On the west is Taylor valley, through which passes the road from Oakland to Martinez. There are numerous smaller valleys on both sides of these larger ones, all connected by wagon roads, and many of them fertile and well cultivated. The average crops, for several years past, in most of these valleys, have been thirty bushels of wheat, or fifty bushels of barley to the acre.

The Hambre, or Hungry valley, at the mouth of which the town of Martinez, the county seat, is located, is separated from the main valley system by a range of low hills—a portion of the Monte Diablo range—which afford excellent pasturage for cattle and sheep. The county, in 1867, contained 27,000 sheep, 11,000 cattle, and 8,000 horses.

The subordinate group of elevations, which lies to the west of Martinez, is known as the Contra Costa hills, which extend through this and the adjoining counties of Alameda and Santa Cruz, being separated from the main Monte Diablo range by a chain of beautiful valleys nearly sixty miles in length.

The principal streams in this county are the San Pablo and San Ramon creeks, the former rising in the Contra Costa hills and emptying into San Pablo bay, the latter rising in the Monte Diablo range, near Livermore's pass, and emptying into Suisun bay, about five miles south-east from Martinez. When this creek reaches the tules it becomes a tide water stream, navigable at high tide for schooners drawing six feet of water. The town of Pacheco was founded, near the head of navigation, in 1858, and has since become the most important shipping port and business centre in the county. The place contains large stores, granaries, churches and schools, and about six hundred inhabitants, who do a thriving business with the numerous rural communities scattered throughout the adjoining valleys; 700,000 bushels of wheat, besides other products, were shipped from this place in 1867.

The population of this county and the value of property in it, have greatly increased since 1860, in consequence of the settlement of land titles—nearly the entire county having been previously claimed by Mexican grant holders—a number of different parties sometimes advancing claims to the same tract of land. This conflict of ownership prevented settlers, for many years, making improvements; but since the adjustment of these land questions, the population and wealth of the county have increased rapidly. In 1860 it contained 5,328 inhabitants, and the value of all the property in it was assessed at $600,000. At the close of 1867, it contained about 10,000 inhabitants, nearly three thousand of whom were children under fifteen years of age—less than two hundred Mexicans and Spaniards; and the value of its real and personal property exceeded $4,000,000.

On the northwestern corner of this county, at the mouth of San Pablo creek, is the original San Pablo bay, the name of which has since been applied to the great central division of the bay of San Francisco, which was formerly called the bay of Sonoma. The level lands in this section of the county produce heavy crops of grain and fruit.

Contra Costa county at present contains but little timber, except oak. At one time there was a fine forest of redwood in the mountains, a few miles east of the bay of San Francisco, but its proximity to the city caused its early conversion into lumber, much also being split into rails for fencing purposes. At present, only a few trees in spots difficult of access, are left standing. The redwood being tenacious of life, it is not an easy matter to kill or eradicate its roots, wherefore, there is a possibility of this forest renewing itself in process of time, if protected from the wood cutter's depredations. On the hills that skirt the base of Monte Diablo grow a few scattered pines of an inferior species, worth but little for lumber. At present there is not a saw mill in the county—a fact that sufficiently indicates how completely it has been stripped of what valuable timber it once may have contained.

The climate of this county, influenced by the position and height of its mountains, is subject to great variations. Monte Diablo, a prominent landmark in this part of the State, 3,381 feet high, is the principal agent in producing these atmospheric changes. This mountain is supposed to have been at one time a volcano, a presumption strengthened by the double cone forming its summit when viewed from the east, caused by the breaking away of the rim of its crater on that side. It is situated in the northern part of the county, and has a length of eight or ten by a breadth of five or six miles. It is somewhat crescent-shaped, the concavity opening to the northeast, and forms a barrier to the winds coming from both the interior and the sea, which sometimes blow with great violence about its base, while the atmosphere higher up its sides is but little disturbed and even quite calm at its summit. It is a grand and singular sight to see from its top, where all is clear and tranquil, the clouds rolling in stormy commotion far below. These atmospheric phenomena are most strikingly manifested after mid-day, in the fall of the year. For several hours in the afternoon, the dry and heated air from the interior sweeps up the mountain with a strong current. About three o'clock the moist air from the ocean begins to reach it, and the two currents meeting, form fleecy clouds which hang around its base and fill its lower valleys, condensing, as the night comes on, into heavy and refreshing dews.

The climate in the northwestern portion of this county is sometimes quite cool, and frosts are frequent, but, where sheltered, fruits of all descriptions grow luxuriantly. Dr. John Strentzel, a Pole, one of the pioneer settlers in the county, has a fine orchard of about forty acres in the Cañada de Hambre, two miles from the town of Martinez, in which oranges are grown in the open air.

Juan B. Alvarado, who was governor of California from 1836 to 1842, when it was Mexican territory, cultivated an orchard in this vicinity, the apples and pears from which, for several years after California became a State, produced him a larger revenue than did the office of governor.

Dr. John Marsh, was one of the earliest American settlers in this county, and, in 1840, purchased a tract of land now known as the New York ranch, located about thirty miles from Martinez. The history of this eccentric man is replete with interest. Educated a physician, and possessed of ample means, on the death of his wife he left his early home and only child in the State of Wisconsin, and coming to California, took up his residence in a cañada at the base of Monte Diablo, now known as Marsh's cañon. Here, living in rude independence, after the manner of the country, he became the owner of immense herds of cattle, which, with his landed possessions, made him rich under the new order of things inaugurated by the discovery of gold in California. In the meantime, his son, who had grown up to manhood, having heard from returned Californians that there was a Dr. Marsh living in that country, and suspecting that it might be his father, left his home at Petersburg, Illinois, and came out to this State, arriving at San Francisco in March, 1856. Having ascertained the residence of the person whom he was in search of, he at once proceeded to the place and found that he was indeed his long absent parent, with whom he took up his abode, remaining with him until the time of his death, which occurred in the autumn of the same year. Dr. Marsh, while on his way to San Francisco, was waylaid and murdered, it being supposed that he had a large sum of money on his person. The murderer, after escaping for more than ten years, was finally apprehended and convicted of the crime.

This county was not generally settled until 1850, there not being a town in it the origin of which dates prior to the discovery of gold, in 1848. One of the first American families settling within its borders was that of Elam Brown, who built a house in Taylor valley, in 1847, near the spot where he now resides.

Martinez, the county seat, is situated in a valley on the south shore of the straits of Carquinez, opposite the town of Benicia. The straits at this point are about three miles wide and eight long, lying between gently-swelling hills, cultivated to their summits. The town contains several fine public and private buildings, with a number of churches, many of the dwellings being surrounded by orchards and gardens. It is the center of a considerable trade, has good wharves for the shipment of produce, and is connected with Benicia by a steamboat ferry.

The coal mines in this county, to the development of which it owes much of its present prosperity, are located about six miles south from the San Joaquin river. A nearly level plain extends from the river (where there is an average depth of thirty feet of water,) to the foothills of the mountains, and within a mile of the Black Diamond company's tunnels, at Nortonville. These tunnels enter on the northeast side of the mountain, and follow a number of seams to the west. Only two of these seams are worked at present—the Black Diamond and Clark—the former averaging four feet, and the latter about three feet in thickness. Both lie at an angle of thirty degrees, and dip nearly north. These mines, although, as above explained, within five miles of navigable water, are located among the peaks and deep cañons of such a rugged country that the difficulties and expense attending the transportation of so bulky an article as coal impeded their development until February, 1866, when the Pittsburg railroad was completed. In the construction of this road, only five and a half miles in length, from the mines to the wharf at Pittsburg Landing, many obstacles were encountered. To the plain, from the mines, a distance of a mile and a half, the road has the unusual gradient of two hundred and seventy-four feet to a mile, that of the balance being from forty to one hundred and sixty feet to the mile. The rugged character of the country may be inferred from the fact that to complete the first mile and a half of this road eight large trestle bridges had to be built, the largest being three hundred and four feet long by sixty feet high. A tunnel, three hundred feet in length, was required to be cut through a steep rocky ridge—a number of deep cuts were excavated, and heavy culverts constructed. When the road was completed, it was found necessary to have locomotives of a peculiar pattern, to overcome the difficulties of ascending and descending such steep grades. Accordingly, a style of engine was invented and made at San Francisco, weighing seventeen tons, and supplied with three pairs of thirty-six inch driving wheels, and complex, powerful brakes. The friction of these locomotives, when descending the incline in front of a train of loaded cars is, of course, great, but, thus far, no serious accident has occurred. This road, which cost $145,000, has a capacity to transport over it three thousand tons of coal daily. The Pittsburg, Union and Eureka companies all send their coal over it.

The Black Diamond company have built a railroad which terminates at New York, a town six miles west of Pittsburg landing. The arrangements made by this company to convey their coal from the mine to the vessels at the wharf afford another good illustration of engineering skill—the mouth of the main adit of the mine being nearly five hundred feet above the level of the plain. To avoid the steep grade that would be necessary were a railroad employed, a massive incline has been constructed, nearly nine hundred feet in length, at an angle of fifteen degrees, which connects with the railroad at the lower end. By means of a thick wire rope passing over an iron cylinder, nine feet in diameter, the loaded cars descending pull up the empty ones. This road, since first built, has undergone material alterations, involving a heavy outlay of money. The arrangements at the wharves of both roads are similar, and vessels of five hundred tons burthen are loaded in a few hours by means of shutes passing from the cars. These mines give employment to upwards of one thousand men.

Prior to the construction of the railroads mentioned, Antioch, a small town on the San Joaquin river, was the shipping point of all the coal mines. Owing to its many natural advantages, it continues to grow, notwithstanding the loss of that trade. At this place are located the California copper-smelting works, not at present in operation; also an extensive pottery, at which superior earthenware, fire-brick, and crucibles, are made from clay obtained from a thick seam found accompanying the coal in the Black Diamond mine. The wharves here are very substanstially constructed. The coal from the Teutonia and Central mines is hauled to this place by teams for shipment. Clay used by the Golden State Pottery is obtained from Marsh's ranch, fourteen miles distant. This establishment has three kilns, which are kept in constant use. Arrangements are in progress for making white stoneware. Large quantities of common brick are also made here for the San Francisco market, the soil being well suited to their manufacture. The broad plain lying between the river and the mountains, on which grow fair crops of the cereals, is rapidly settling up, nearly one hundred families having located upon it in 1867. Much of it, formerly used only for pasturage, is now under cultivation. The Stockton steamers make regular landings at Antioch, whence there are numerous good roads communicating with the back country.

Clayton, the largest town created by the coal-mining interest, stands at the head of Diablo valley, about eight miles from Pacheco. It occupies a romantic site, being on a plateau in the midst of wide-spreading oaks, commanding a good view of the adjacent valley and the bay, with rugged mountains in the distance. Its origin dates only from 1862, and, although so recently founded, there are many fine orchards, vineyards and gardens in the vicinity. It contains about nine hundred inhabitants, and, considering its age, is well built up. The larger portion of the population find employment in and about the coal-mines near by. There are several other small towns and villages in this county, the most of them of too little importance to require special notice.

The soil in the valleys about Monte Diablo, consists of a fine loam, formed by the disintegration of the calcareous and volcanic rocks, and is well suited to the raising of vines—a business extensively carried on in many of them. Mr. Clayton, after whom the town is named, has a vineyard here of 30 acres, containing 30,000 vines, which, though vigorous and prolific, have never been irrigated. He sends his grapes to San Francisco for a market, realizing a greater profit than in making them into wine. There are other large vineyards, with several fine orchards bearing various kinds of fruit, elsewhere in the valley, the aggregate number of vines it contains being estimated at 100,000, and the fruit-trees at 30,000. While much of the land in this valley is held at high prices, a good deal of fair quality can be bought at prices ranging from $15 to $25 per acre.

Silver-bearing ores have been found at various places about Monte Diablo. Sixty pounds of ore, taken from a claim known as the Open Sesame, in 1863, yielded, by working process, at the rate of $48 33 per ton in gold, and $243 per ton in silver; while the San Pedro ledge yielded ore that assayed at the rate of $40 per ton. The broken stratification in this district, however, has thus far rendered all attempts at working these claims abortive.

During 1862, and the following two years, some fifty cupriferous deposits were partially explored in the vicinity of Monte Diablo; and, although a considerable quantity of ore was obtained from them, it was of too low a grade, and the seams were too much broken up, to warrant a continuance of operations.

In 1862, large deposits of ochreous earths were discovered near Martinez, consisting of six well defined strata, varying from three to twenty feet in thickness. The colors of this material are red, green, yellow and blue, with every conceivable tint formed by their blending, the entire number of colors produced consisting of eighty varieties, running from pale blue to a bright scarlet. The terre sienna, French yellow, and Venetian red, were pronounced very good by the painters who used them. Expensive works were put up for grinding and preparing this substance for market, but the enterprise failing through the limited demand and cheap price of the imported article to prove remunerative, was abandoned soon after.

Argillous magnesian limestone, similar to that used in making the dry hydraulic cement at Benicia, exists near Martinez. Good potters' clay is abundant near Lafayette, and is extensively used by the pottery works at San Antonio, Alameda county.

Small deposits of petroleum have been observed, at various points, in this county. Several years since, an oil-boring operation was commenced and carried on for some time, at a point about three miles south-east from the town of San Pablo. This was the first effort of the kind made in California; and, though conducted with a due degree of skill and energy, it failed of success. Several attempts to procure mineral oil in quantities have been made elsewhere in the county, either by sinking shafts or boring, but as yet with scarcely any better results than attended this pioneer effort. At the present time, a party is boring for oil in Marsh's cañon, and, as it is said, with prospects not altogether discouraging.

## MARIN COUNTY.

Marin county comprises the peninsula lying between San Pablo bay and the ocean, its extreme southern portion, Point Bonita, forming the outer headland to the entrance of the Golden Gate. Much of the county is covered with hills and mountains, through which are scattered numerous narrow, but fertile valleys. Tamalpais, the culminating peak in a rugged chain of mountains traversing the county from northwest to southeast, near the sea, has an altitude of 2,600 feet; there being several other peaks in this range of almost equal height. Much of the land, both in the valleys and upon the hills throughout the northern and central portions of the county, produces an abundant pasturage, upon which immense herds of milch cows are fed; more butter being made here than in any other county in the State—the annual product approximating 1,500,000 pounds. Redwood and pine grow on the mountains, and oak in many of the valleys and on the lower hills. From the former, two steam saw-mills located in the northern part of the county, manufacture considerable quantities of lumber. The Pacific Powder Mill, and the Pioneer Paper Mill, are situated on Tokeluma or Daniel's creek, which, heading in the Tamalpais range, runs northwest, emptying into the head of Tomales bay. The water of this creek, owing to its infiltration through a hard granitic rock rendering it exceedingly pure, is especially adapted to the manufacture of paper. Tomales bay, extending inland sixteen miles in a southeasterly direction, varies in width from two to three miles. It occupies the largest valley in a series lying between a number of parallel ridges that occupy this section of the county. Between Tomales and Bolinas bay lies a rich valley eight miles in extent. The town of Tomales, situated near the entrance of the bay, is an active and growing place, much of the produce of the adjacent country being shipped here for San Francisco. It contains a population of six or seven hundred, and occupies a handsome site on a level bench extending back from the bay. Olema, at the head of Tomales bay, fifteen miles northwest of San Rafael, is another thrifty town, enjoying the trade of a large dairy and agricultural district, which never fails to produce heavy crops of potatoes and grain, owing to the current of moist air from the ocean, which, passing through the depression that here exists between the mountains, greatly aids the growth of vegetation. Here the grass, when completely dried up elsewhere, is found to be green and succulent.

Punta de los Reyes (King's point) forms the extremity of a high rocky promontory, extending into the sea several miles in a southwest direction, separating it from Drake's bay.

This county countains about 600 square miles—nearly 400,000 acres, 175,000 of which are enclosed; only about 25,000 acres are under cultivation; the greater portion of the arable land being used for pasturage. Some five or six thousand acres of the mountain lands are covered with timber capable of being made into lumber, the swamp and overflowed land in the county consisting of twelve thousand acres on the margin of San Pablo bay.

Messrs. Howard & Shafter have 75,000 acres of land enclosed in this county, upon which are grazed 3,500 cows. These are divided into seventeen dairies, the aggregate product of which is 700,000 pounds of butter annually. Allen & Son, of Green valley, have a herd of 350 milch cows, all of choice breeds. Stock here is never housed, or fed with anything more than is afforded by the native pasturage. The product of butter averages about one pound daily to the animal, or two hundred pounds for the season. This butter, if sold for no more than twenty-five cents per pound—considerably less than is actually realized—pays, in the course of two years, for cost of cows, attendance, and interest on capital, leaving the natural increase of stock, skim-milk and cheese, for clear profit. Butter-making, where circumstances favor, has always been found a lucrative pursuit in California, this article never failing to find a ready market and to command a good price; while the localities favorable for carrying on the business on a large scale, are by no means numerous; an abundance of nutritious feed, a cool climate, and at least a fair supply of water, not often being found in conjunction. In Marin county, these advantages being enjoyed to an unusual extent, dairymen have confined their operations almost exclusively to this branch of the business, though the lack of facilities for sending their milk to the San Francisco market may have contributed towards the conversion of so large a proportion of it into butter and cheese, there being over half a million pounds of the latter made annually. It is estimated that there are upwards of one hundred dairies in this county, many of them of large size. They give employment to a good many men, the usual allotment being about twenty cows to one hand. Marin, in 1860, contained 3,334 inhabitants, the present number being estimated at something over 5,000.

This county derives its name from Marin, a famous chief of the Lacatuit Indians, who originally occupied this part of the country, and who, aided by his people, after having vanquished the Spaniards in several skirmishes that took place between the years 1815 and 1824, was finally captured by his enemies. Making his escape, Marin took shelter on a little island in the bay of San Francisco, and which, being afterwards called after him, communicated its name to the mainland adjacent. This chief having fallen into the hands of his foes a second time, barely escaped being put to death, through the interference of the priests at the mission San Rafael, who subsequently enjoyed the satisfaction of seeing him converted to the true faith. He died at the mission which had been the scene of his rescue and conversion, in the year 1834.

San Rafael, the county seat, occupies a handsome site, about two miles west of San Pablo bay, and fifteen in a northerly direction from San Francisco. Its sheltered position, being screened from the fogs and ocean-winds by the Tamalpais range, renders it one of the most attractive spots in the vicinity of San Francisco, many of whose business men and wealthy citizens have erected their dwellings in the neighborhood of the town, which abounds with beautiful and eligible sites for the purpose. Within the past few years, a large number of residences have been built there by this class, and other improvements made, tending to enhance the value of property and add to the attractions of the place.

Although nearly the whole of this county was originally covered with Mexican grants, and there was scarcely an American settler within its limits prior to 1850, nearly the whole of it is now owned by the latter race, the most of its former proprietors having, with their possessions, passed away.

The Pioneer Paper Mill, erected in 1856, is situated about four miles from Olema, on the road leading to San Rafael. The buildings are spacious and substantial. The motive power used consists of both steam and water, and the works, which employ about forty hands, are run night and day. During the year 1867 there were made at this establishment 384 reams of colored, 3,500 reams of news and book, and 9,250 reams of Manila and wrapping paper, the whole valued at $64,800. The following embrace items of the principal material consumed in the manafacture of this paper: 300 tons of rags and old rope, gathered chiefly in San Francisco; 250 barrels of lime, made in the vicinity; 2,000 pounds sulphuric and muriatic acid, made at the San Francisco Chemical Works.

The Pacific Powder Mill, located about three miles east of the Paper Mill, was completed in 1866, at a cost of $63,000. During the year 1867 there were manufactured here about 30,000 kegs of blasting powder, and over 2,000 packages of sporting powder. The buildings are distributed over an area of several hundred acres, for greater security against explosions. Both steam and water power are used in preparing the material and running the machinery. An explosion occurred here in November, 1867, causing the death of three workmen, and doing considerable injury to the works. The latter, however, were soon after repaired, and are again in operation.

The State Prison is located in this county, on Point San Quentin, twelve miles north of the city of San Francisco. The buildings, constructed of brick, and having a capacity for the retention of seven hundred convicts, the number now imprisoned there, are situated on a tract of land owned by the State, eight acres of which are walled in, the balance being mostly devoted to the purposes of brick making, which business has been carried on extensively by convict labor. The greater portion of the prisoners, however, are employed as coopers, tailors, cabinet makers, shoemakers, saddlers, etc., being hired out by the State to contractors, who pay fifty cents per day for their labor.

As yet, no valuable deposits of minerals have been found in this county, though it abounds in granite, limestone and other useful building stone, and a number of quarries have been opened within its limits.

## SONOMA COUNTY.

Sonoma county is bounded on the north by Mendocino and Lake counties, on the east by Lake and Napa, and on the south, southwest, and west by Marin county and the ocean. It is about fifty miles in length with an average width of twenty-five miles, comprising an area of about 850,000 acres, of which nearly 300,000 are inclosed, and 200,000 under cultivation.

The chief topographical features of this county are its four magnificent valleys, Petaluma, Sonoma, Santa Rosa and Russian river, through which flow considerable streams bearing their respective names. The two former are in the southern part of the county, separated by low mountain ridges. Crossing the northwestern and central portions of the county is the more lengthy but narrow valley of the Russian river. Petaluma and Sonoma creeks flow southeasterly, and empty into San Pablo bay. They are navigable for small craft as high up as the tide reaches—a distance of about fifteen miles. Russian river, although a large stream, is not navigable, owing to bars and rapids.

The northern part of the county is mountainous, being traversed by spurs from the Coast Range, which in some places rise to a height of two or three thousand feet. Pine mountain, in the northwestern part of the county, reaches an elevation of 3,500 feet—Sulphur Peak, near the Geysers, in the north-eastern part, being 3,471 feet high. Many of the mountains, and even some of the lower hills, are covered with redwood—pitch, or yellow pine, (*pinus ponderosa,*) sugar pine (*pinus Lambertiana,*) spruce, or red fir, (*abies Douglasii,*) and California nutmeg, (*Torreya Californica,*) being found upon the higher ranges. Portions of the valleys and hills are covered with a scattered growth of oak, madroña, and other scrubby trees—sycamore and small willow being found along the water courses. There are thirteen saw mills in different parts of the county, making lumber chiefly for local consumption, though considerable quantities are exported from Bodega, Fort Ross, Timber Cove and other points in the northern section of the county. The amount of lumber manufactured in Sonoma annually is estimated at 12,000,000 feet. The most of the produce exported from the southern end of the county is sent from Petaluma, between which place and San Francisco three lines of steamers and a large number of small sailing vessels ply constantly.

Petaluma is situated on a creek of the same name, and about a mile above the head of navigation, a railroad having been constructed connecting the town with the landing. It lies about forty-five miles northwest of San Francisco, and is a growing place, the population having increased from 2,500 to over 4,000, within the last four years. It now contains seven churches, a college and a number of schoolhouses, a planing-mill, a sash and door factory, a soap and a match factory, with a ship-yard whereat vessels of as high as ninety tons' burden are built. The name of the town signifies, in the Indian tongue from which it is derived, "Duck hill," the locality having been famous as a resort for wild ducks prior to its settlement by the whites. A railroad, extending from some point on San Pablo bay to Healdsburg, on Russian river, having become an urgent necessity, the inhabitants of the county are making strenuous efforts to secure its construction, which there is good reason to believe will be effected at an early day, either by building a line direct from Petaluma to Healdsburg, or continuing the Napa and Calistoga road, now nearly finished, to that place. Once built to Healdsburg, there is little doubt but a railroad would be prolonged up the Russian river valley, until by gradual stages it might reach the interior of Mendocino county, if not ultimately the head waters of Eel river, following down the same to some point on Humboldt bay, and thus become the means of opening an extensive and valuable, but at present almost inaccessible region to trade and settlement.

Sonoma county enjoys an even and agreeable climate, rarely suffering from the strong winds that prevail during the summer at San Francisco, while its proximity to the ocean moderates the fierce heat of the interior, insuring a mild and agreeable temperature throughout the year. The moisture imparted by the sea-air to the soil, in the valleys a rich alluvion, and on the uplands a yellow loam, tends to keep vegetation green, thereby insuring abundant pasturage and almost uniformly good crops in all parts of the county. In the valley of Russian river, good crops of Indian corn can be grown without irrigation, this being one of the few localities in the State where this cereal can be raised with facility. The number of acres of this grain planted in the county, in the year 1867, is estimated at 5,000, yielding 150,000 bushels. The country in the vicinity of Bodega is particularly well adapted to the culture of the potato, of which there were 4,000 acres planted in 1867, producing 150,000 bushels.

The name of this county is of Indian origin, signifying, in that language, the "valley of the moon," a term peculiarly appropriate, since a more beautiful spot than the great Sonoma valley, seen on a moonlight night, can scarcely be conceived of. This was also the name of a notable chief of the Chocuyen tribe, who inhabited this valley in the days of the missionaries.

Santa Rosa, the county seat, situated in a valley of the same name, about sixteen miles north from Petaluma, occupies a handsome site on the Santa Rosa creek, a small stream which, running west, falls into Russian river. The town is surrounded with oak and other forest-trees, and has a well fenced plaza filled with trees, shrubs and flowers. Around this central square, the most of the stores, hotels, and other business places, are located. The first settlement upon this spot was made in 1852. The court-house is a fine building, besides which the town contains several churches and school-houses, and a number of elegant private residences. In 1860, Santa Rosa had a population of 700, which seven years later had increased to 1,800. The valley in which it is situated is about ten miles long, and six wide. It is under a high state of cultivation, and is surrounded by scenery of surpassing beauty, the Cascade mountains, a low but picturesque range, bounding it on the west, and a much more lofty and rugged chain on the east; the bold peak of Mount St. Helena, sixteen miles distant to the northeast, lifting itself to a height of 4,343 feet.

Healdsburg, another prosperous town, is located in the Russian river valley, at a point where it deflects to the southwest, and near the confluence of that stream, with Knight's creek, having its source in Mount

St. Helena, about twenty miles distant to the east. The town derives its name from Harmon Heald, who, in 1846, established a trading-post in the vicinity, for supplying the hunters and trappers in the neighboring mountains. It stands on a broad, fertile plain, having an altitude of one hundred and seventy-five feet above the waters of San Francisco bay, from which it is distant nearly fifty miles, being about forty miles north of Petaluma. It is the natural trade-center of a large agricultural region, embracing the several valleys of Russian river, reaching fifty or sixty miles to the north—Knight's creek, Dry creek, Santa Rosa, and several smaller valleys, through all of which run good roads converging to this place. The site of the town is no less beautiful than eligible, being surrounded by scattered groves of old oaks, and other trees of native growth, with a panorama of picturesque mountains in the distance. In 1867, it contained 1,500 inhabitants, of whom 410 were children under fifteen years of age. Three years before, the population numbered but 600, of whom 500 were adults. The excellence and cheapness of the land, together with security of title, and the prospect of early railroad communication with the bay of San Pablo, have contributed to greatly encourage settlement in this part of the county. The majority of the inhabitants came originally from the southern and southwestern states—a circumstance indicated not more by the peculiarities of their manners than the style of their houses, most of which have huge chimneys built outside, after the custom in their early homes.

In 1841, eight square leagues of the valley, adjacent to Healdsburg, were granted by the Mexican government to an American family by the name of Fitch, some of whom continue to reside in the vicinity, though nearly all of this extensive grant has now passed from their possession. About two miles east of the town, stands an isolated peak some five hundred feet high, known as Fitch's mountain, being nearly the only reminder left of this pioneer family. The view from the top of this mountain is extremely fine, from whence may be seen Mount St. Helena to the east, the numerous ranges of Mendocino lying north, and the Pacific ocean on the west—the whole comprising a landscape abounding with striking features and diversified scenery.

The city of Sonoma is the oldest settlement in this county, the mission of San Francisco de Solano having been founded here in 1820. The old buildings first erected still remain, though latterly converted into a church supplied with pews, cushions, carpets, gaslight, and all the modern improvements in ecclesiastical decoration. In its capacious auditorium, which once resounded with the uncouth jargon of half-clad savages, is now heard the melodious voices of a well trained choir, mingling with the strains of instrumental music. The town is situated a short distance east of the creek that runs through the center of the valley. It is distant about twenty miles southeast of Santa Rosa, and forty miles northerly of San Francisco. Some of the original houses built here are large and, though made of adobe, are two stories high. They surround the usual courtyard, and are adorned with porticos and corridors after the Venetian style, imparting to them a commanding appearance—this having been the residence of the élite of the native Californians. Many of them were neatly painted, and surrounded with gardens, orchards, and walnut-trees. The residence of Gen. M. G. Vallejo—a spacious building, in which so many, both foreign and native, once enjoyed his hospitality—was demolished in 1866, and an elegant hotel erected on the spot; the former proprietor having parted with this, as well as with nearly all the residue of his property in the county. The town of Sonoma, which in 1864 contained only five hundred inhabitants, now numbers over one thousand. The valley of Sonoma, about six miles wide and twenty long, is one of the most beautiful, as well as fruitful and highly cultivated, in the State, it being covered throughout nearly its whole extent, and, in many places, even to the summits of the adjacent hills, with grassy pastures, grain-fields, orchards, vineyards, and gardens. The soil and general appearance of the valley, bear a striking resemblance to the vine-districts of Johannesberg, Hockheimer, Stienberger, and other famous wine-producing localities in the vicinity of Bingen on the Rhine; and there is no doubt but the white wines of this county will, in a few years, when their good qualities come to be more fully known, attain to as great a popularity in Europe as those of the Rhenish provinces. The yield of grapes to the vine, and also of juice, is much greater here than in France, Italy, or Germany, many of the vineyards in Sonoma yielding about 1,000 gallons to the acre, while in France the yield is not over 200; in Germany, 250; and in Italy, 400 gallons to the acre.

Appended is a list of most of the principal vineyards in this county, with the number of vines and acres planted in grapes at the close of the year 1867:

VINEYARDS IN SONOMA VALLEY.

| Proprietors. | Acres. | Vines. |
|---|---|---|
| *In the vicinity of the Town.* | | |
| Buena Vista Vinicultural Society | 375 | 380,350 |
| Estate of General C. H. S. Williams | 120 | 84,000 |
| Dresel & Gendlach | 120 | 85,000 |
| J. Lutgens | 30 | 24,000 |
| Haraszthy Brothers | 58 | 70,000 |
| Major Snyder | 30 | 21,000 |
| General M. G. Vallejo | 50 | 35,000 |
| Mrs. Col. Haraszthy | 140 | 300,000 |
| Mr. Maxwell | 35 | 25,000 |
| Colonel Walton | 25 | 18,000 |
| *On the west side of the Valley.* | | |
| Nicolas Carriger | 180 | 150,000 |
| O. W. Craig | 75 | 60,000 |
| Thos. J. Poulterer | 20 | 15,000 |
| W. McP. Hill | 35 | 30,000 |
| George Watriss | 25 | 20,000 |
| Jackson Temple | 50 | 60,000 |
| Lamott & Co. | 30 | 25,000 |
| Adler & Co. | 30 | 25,000 |
| About twenty-five small vineyards, aggregating | 300 | 235,000 |
| *Middle of Valley.* | | |
| Stewart & Warfield | 140 | 110,000 |
| Krohn & Williams | 60 | 50,000 |
| Mr. Whemquartner | 35 | 30,500 |
| Several small vineyards, in all | 50 | 37,500 |
| *East side of Valley.* | | |
| James Shaw | 20 | 16,500 |
| Thomas Naus | 40 | 33,000 |
| Lamott & Co. | 25 | 20,000 |
| Several others in this vicinity | 102 | 100,000 |
| *Near Santa Rosa.* | | |
| James Shaw | 35 | 30,000 |
| William Hood | 65 | 50,000 |
| In Bennett's valley | 170 | 125,000 |
| Above Santa Rosa, in the vicinity of Petaluma, and the balance of the county | 400 | 300,000 |
| Total | 28,870 | 2,564,850 |

Of this number of vines, at least 1,000,000 are not bearing. It is estimated there were about 400,000 vines set out in this county during the winter of 1867–8; the number planted the preceding year having been 500,000. The vineyards here are chiefly planted with the native California vine, which thrives better without irrigation than most of the foreign varieties, is less liable to mildew, yielding, withal, a wine of good body and easily kept. The Sonoma wine differs from that produced in other parts of the State, being lighter and more tart, and well adapted for champagne purposes. Isador Landsberger, wine dealer, of San Francisco, and the Buena Vista Vinicultural Society, are engaged in making champagne from these wines. The former manufactured from the vintage of 1866 six hundred dozen bottles of this article, and the latter four hundred dozen. Mr. Landsberger also purchased the entire product of 1867 from the vineyard of the Haraszthy Brothers, amounting to 15,000 gallons, for the same purpose.

The grape from Lutgen & Dresel's vineyards is said to yield a wine resembling the Moselle of France, more than any other in the State; Jackson Temple's vineyard, called the Tokay, produces a wine similar to the famous Hungarian tokay.

Extending north from Marin county, nearly to Russian river, is a belt of rich country which produces fine crops of grain and grass, even to the summit of the hills. This is the famous Bodega potato region, and includes Twin Rock and Big valley, the northern part of which is thickly timbered with redwood. Near the mouth of Russian river is a large saw mill, with a railroad connecting it with the forests on the mountains, two miles above. Valley Ford and Bodega Corners are active villages containing a number of churches, school houses, and stores, and having a population, including that of the adjacent district, of about two thousand. The products of this section of the county are shipped to San Francisco, via Bodega bay. In the vicinity of Bodega Corners, and about sixteen miles northwest of Petaluma, an extensive business is carried on in the preparation of charcoal for the San Francisco market, many thousand bushels being made here annually. Hundreds of acres have been cleared by the charcoal burners of Sebastopol, as the nearest town is called, the pine in this region making a peculiarly solid coal.

The "Geysers," a collection of hot springs, one of the greatest curiosities in the State, being alike extraordinary for their varied appearance, and the chemical composition of their waters, are situated in this county. The locality of this singular exhibition of subterranean chemistry is in a deep gorge, in the northeastern part of the county, about fifty miles from Petaluma, known as Pluton cañon, and through which flows Pluton creek, emptying into Russian river. The spot is wildly picturesque, being in the vicinity of some of the highest peaks in the Coast Range of mountains. The springs, which extend for nearly a quarter of a mile, in the middle of the cañon, cover about two hundred acres. They are elevated about 1,700 feet above the level of the sea, and are surrounded by mountains from three thousand to four thousand feet high. This cañon has evidently once been the theatre of intense volcanic action, the rocks being burnt into a great variety of colors.

There are over three hundred springs and jets of steam in this cañon, from an inch to several feet in diameter, the depositions from which vary from snowy white to inky black in color. The water contains iron, sulphur, and the various salts of lime, magnesia, ammonia, soda, and potash, emitting the characteristic odor generated by hydrosulphuric acid. The registry at the hotel kept here is written with the dark-colored contents of one of these springs. The rocks, over which the waters from these springs flow, are coated with the compounds of sulphur, lime, and magnesia. Epsom salts, alum, sulphur, and sulphates of iron can be collected here by the wagon load.

The two greatest attractions in the cañon are the Witches' Cauldron and the Steamboat Spring. The former consists of a cavity about seven feet in diameter, and of unknown depth, filled with a black, viscid fluid, which, boiling with intense energy at a temperature of 200° Fahrenheit, bubbles and splashes, rising occasionally two or three feet above the sides of the cauldron, though never running over it. The rocks for several feet above this infernal fountain, over which its contents have splashed, are covered with innumerable crystals and stalactites of pale sulphur. The dark color of this mass is caused by the water of a spring holding iron in solution, having, through contact with other water containing sulphureted hydrogen, formed a new compound, whereby the latter has been set free—and hence the fœtid odor. When it is recollected that to the presence of this gas, putrid eggs, bilge and sewer water owe their peculiarly offensive smell, some idea can be formed of the abominable odors escaping from this place.

In the year 1861 this cauldron, from some unknown cause, was emptied of its contents and filled with steam. The proprietor of the hotel at the place, fearing that it would thus be deprived of one of its greatest attractions, caused a small stream of water to be led into the cauldron, curious himself to see what would be the result. The instant the cool water came in contact with the lower portion of the cavity a fearful commotion ensued. The ground, for several rods about, shook with violence, and in a few minutes after, the inflowing water was ejected with stunning reports, and thrown to the height of nearly one hundred feet. In about three hours after the water was shut off the viscid fluid reappeared, and has continued to boil and bubble ever since.

The Steamboat Spring, situated only a few yards from the Cauldron, consists of an opening in the rocks at the bottom of the cañon, about two feet in diameter, through which is constantly ejected, with the noise of a number of steamers, a body of steam sufficient, could it be controlled, to propel a large amount of machinery. This steam is so hot as to be invisible for five or six feet above the aperture through which it issues. On a clear day it rises in a column to a height of more than three hundred feet.

The earth, in the vicinity of the largest of these springs, is hot, and full of sulphurous vapors, which constantly escape from the surface. The ground, for some distance around, shakes and trembles, and the visitor, by stamping his foot, causes a terrible noise to resound through the cavernous spaces below. If he steps out of the beaten track, or thrusts his cane through the thin crust that has hardened on the surface, hot, sulphurous steam escapes from the aperture. The noise of so many steam vents, each blowing off in a different key, and at irregular intervals, produces a most discordant din. Some of these sounds are subdued and gentle, scarcely louder than the breathings of a horse after a severe run; some resemble a low growl emitted at intervals of about a minute, while others can scarcely be distinguished from the puffings of a high pressure engine. With all these noises above the surface of the earth and below, the loathsome smell of sulphur and hydrogen, and the tremulous motion of the ground beneath one's feet, a feeling of insecurity inevitably impresses itself upon the minds of those who visit this place for the first time. Among the many singular things to be seen in this strange cañon, are hot and cold water issuing from springs but a few feet apart, and in other places water issuing from the same orifice, and apparently from the same source, but differing essentially in color, taste, smell, and chemical composition. The water of Pluton creek, which, when it enters the cañon, is at a low temperature, becomes heated to about 140° in its passage through it. Stimulated by the unusual warmth of the place, vegetation is at all times vigorous, even about the margin of the steaming pools. In the waters of some of these springs, boiling at 200°, and in others where the water is sufficiently acid to burn leather readily into tinder, *algæ* and *confervæ* find a congenial element, and grow abundantly. Less than forty paces from the focus of this heated region, trees, shrubs, grass and flowers grow with luxuriance, both winter and summer.

About four miles further to the northeast, up Pluton cañon, are the Little Geysers, a series of large springs of intensely hot water, but they do not contain any mineral substance, except a mere trace of iron. They are situated on the side of a gently-sloping hill, at an altitude of two thousand two hundred feet.

Earthquakes are of frequent occurrence in this region. Persons who have resided there since April, 1847, the date of the discovery of these springs, state that the ground about them has, within that period, sunk about forty feet. The heated waters and acids appear to dissolve the solid rocks, which thus gradually sink, as decomposition progresses.

In 1863, a number of good specimens of auriferous quartz were obtained from a ledge discovered on Mark West creek, about seven miles from Santa Rosa, in Bodega township, at which time a mining district was organized. Though gold has been found here, it does not exist in sufficient quantity to warrant the expenditure necessary for the construction of the machinery required for its extraction. Gold has also been found associated with cinnabar, a few miles east of the Geysers. Silver ores have also been met with, and worked to some extent in the range of hills west of Dry creek, nearly opposite Healdsburg. The ores of copper are quite abundant in this county. In 1863 a number of districts were organized for working these mines. They covered a tract of country twenty-four miles in length by five miles in width, throughout which the work of prospecting was carried on extensively for nearly two years, during which time the towns of Suala, Monte Cristo and Copperton, were laid out and partially built up. A considerable quantity of copper ore extracted from these mines was shipped thence to San Francisco, but the cost of transportation and the decline in the value of copper, put a check to operations here in 1865.

Quicksilver exists in considerable quantities, in the mountains in the north-eastern part of the county, which are identical in geological formation with those in Santa Clara county, wherein the New Almaden mines are situated. The deposits of cinnabar in Sonoma county appear to have been affected by the subterranean heat of the Geysers, from which the more important are distant only a few hundred yards. At this locality, the mercury is found in a metallic state. The cinnabar, about a mile to the east, has here been sublimated, and the metal cooled in the cavities of the rock, from a single one of which as much as six pounds of fluid mercury has sometimes been obtained. The Pioneer mine in this vicinity, which was extensively prospected between 1861 and 1864, produced during this period a large quantity of metal, but is not being worked at present. Quite recently, a valuable quicksilver mine has been developed in Pope valley, Napa county, being situated in a continuation of the same formation with the Pioneer mine, of which a full description will be found in the topography of Napa county. Several other claims were located in this county. In the mountains extending to the eastward nearly ten miles, small deposits of cinnabar have been found in a broad belt of rock, nearly the whole distance.

Coal has been discovered at several places along the course of Russian river. The Sulphur Creek and Petaluma Coal Companies, organized to work these mines, obtained considerable quantities of good coal from them, one lump of which exhibited at Petaluma, in 1867, weighed two hundred pounds. The Cumberland Company's mine, near Cloverdale, contained a vein in places nearly seven feet thick, and from which about one hundred tons of coal were sold. Cloverdale is a small place situated on Russian river, in the northern part of the county, about forty-eight miles from Petaluma.

Near the little town of Sebastopol occur extensive deposits of variously tinted ochres and other mineral colors of fine quality. The owner of these "paint mines," Mr. O. A. Olmstead, is about to erect machinery for manufacturing paint from this material. Good freestone and granite are extensively quarried near Santa Rosa; there are also exhaustless quarries of good building-stone near Petaluma. A large deposit of excellent potters' clay exists near Albany, on the dividing ridge between Napa creek and Russian river. Bricks of superior quality are largely manufactured from a bed of good clay found in Knight's valley. Limestone and gypsum are quite plentiful in the mountains along the northern coast.

There are twelve grist-mills in the county, eight driven by steam and four by water, the whole having a capacity to manufacture 1,000 barrels of flour per day. The population of Sonoma, which in the year 1860 numbered only 11,867, amounted to 26,960 in 1867, of whom 7,959 were children under fifteen years of age. The value of real and personal property, assessed at $4,220,005 in 1863, had increased to $7,000,000 in 1867.

## NAPA COUNTY.

Napa county is bounded on the north by Lake, on the south by Solano, on the east by Yolo and Solano, and on the west by Sonoma. It is about fifteen miles in average width, by forty-five miles in length; contains about 450,000 acres, of which nearly one half is valley and upland suitable for cultivation. Upwards of 200,000 acres were under cultivation in 1867. The balance consists of mountains and deep cañons, which are well timbered towards the north. A branch of the

Mayacamas mountains forms the boundary between this and Sonoma county on the west. Mount St. Helena, 4,343 feet high, the culminating peak of this range—the highest point between San Francisco and Clear Lake—is in the north-west corner of this county. This mountain, forming a conspicuous object in the landscape for many miles around, was named in honor of the Empress of Russia by the Russian naturalist, Wosnessensky, who ascended it in 1841. A copper plate recording the ascent, and placed on the mountain at the time, is now in the possession of the officers of the Geological Survey. From this point, the range gradually decreases in altitude till, approaching the end of Napa valley on the south, it sinks into low, grassy, broken hills. This valley, from which the county derives its name, is its chief topographical feature. It lies nearly north and south, extending about thirty-five miles from San Pablo bay, with an average width of about four miles. The upper portion, for a distance of twelve miles from the town of St. Helena, to the base of Mount St. Helena at its head, is only about one mile wide. At Yount's ranch, or Sebastopol, a town of that name nearly in the middle of it, there are a few low hills two miles apart. With this exception, the whole valley is a gentle slope from its head to the tules along the bay. Napa creek, an insignificant but the largest stream in the county, rises at the base of Mount St. Helena, and flows through this valley near its eastern side, until it unites with tide-water in an estuary near Napa city, from whence it is navigable at high tide for vessels drawing six feet of water.

Knight's valley, situated north of the mountains at the head of Napa valley, is seven miles in length by nearly two miles in width, trending nearly east and west, forming a connecting link between Napa and Russian river valleys. This is a beautiful valley, very fertile and picturesque, and surrounded by mountains thousands of feet high, timbered to their summits. This is the timber region of the county, and here are located the two saw-mills it contained in 1867. Pine mountain, nearly 3,000 feet high, so named from the abundance of that timber on its sides, is at the head of Knight's valley. Pope valley extends north-easterly from this point, into Lake county. It contains numerous deposits of quicksilver, some of which are being developed successfully.

Berreyesa valley, in the north-eastern portion of the county, is an extensive agricultural region. Monticello, the principal town in it, is twenty-four miles distant from Napa city. This fine valley trends to the south-east; is fourteen miles in length, by an average of two miles wide, covered with a very rich, deep soil. It is surrounded by mountains, and the Putah creek, flowing through it from one end to the other, enters and leaves through narrow rocky gorges. Until 1866, this valley was used almost exclusively for stock-raising purposes, in consequence of there being no road connecting it with Napa. In that year a road was cut, the value of which is illustrated by the fact that, since then, nearly 15,000 acres of virgin soil have been broken, and planted with wheat and barley. The crops of grain cut here in 1867, were among the heaviest in the State—one tract, containing eight thousand acres, subdivided into small farms, produced an aggregate of one hundred and fifty thousand bushels of wheat, besides a large quantity of barley. So productive and cheap was the land in this vicinity, that, prior to the opening of the road mentioned, many of the farmers who bought their places the previous year, were enabled to pay for their land and improvements from the first crop. The wagon-road, which so greatly facilitated the development of the Berreyesa valley, also aided in opening up several others communicating with it, of much smaller size, but equal in fertility. Valleys of this description are numerous in this and the adjoining counties, and are being rapidly settled by farmers, in anticipation of the completion of the Napa valley railroad, which is nearly finished to Calistoga, twenty-six miles north of Napa city, and will probably be continued thence into the Russian river country.

On the road through Napa valley, towards Calistoga springs, an attractive picture is presented of a California farming district—substantial private dwellings, well fenced fields, broad patches of vineyards and fruit orchards, alternate with grain-fields, extending as far as the eye can reach. On either side of this fine valley are mountains covered with pine and fir, with here and there a clump of cedar; the lower ranges full of thickets of nut-hazel, buckeye, California bay, *oreodaphne Californica,* the most odoriferous plant that grows on this coast; the California lilac, a species of ceanothus; several varieties of oak, the ash, and a dense undergrowth of grasses, clover, wild oats and flowers, which afford food and covert for an immense number of quail, hare, and rabbits. About 500,000 bushels of wheat were harvested in this valley, in 1867. The average yield of all the land sown to this grain, being thirty bushels to the acre, without the use of any fertilizer or artificial irrigation. Fruits of all kinds, and the vine in all its varieties are also very productive. The lower hills are covered for miles with vineyards, and the area of this cultivation is rapidly extending. To illustrate the perfection the foreign varieties of grape attain on these hill-sides, Mr. H. M. Amsbury, in 1867, raised bunches of the

White Nice measuring thirty-two inches in circumference, and weighing upwards of eight pounds each. In another vineyard, bunches of the Flame Tokay were gathered, weighing five pounds each. The vines on these hill-sides are never irrigated—they produce a wine essentially different from that made from grapes grown on the low lands, or where watered.

The extent of the grape-culture in this county may be inferred from the following list of the leading vineyards. The mission grape is almost exclusively cultivated for wine-making, but foreign varieties are grown for table use.

VINEYARDS IN NAPA COUNTY.

| Proprietors. | No. of Vines. | Proprietors. | No. of Vines. |
|---|---|---|---|
| Samuel Brannan | 100,000 | Lewelling | 30,000 |
| R. Kilburn | 12,000 | M. Vann | 10,000 |
| P. Kellogg | 15,000 | Mr. McCord | 20,000 |
| E. Kellogg | 15,000 | C. Cown | 20,000 |
| Charles Krug | 41,000 | Geo. C. Yount | 10,000 |
| D. Hudson | 24,000 | Oak Knoll | 15,000 |
| D. Fulton | 10,000 | Henry Boggs | 20,000 |
| J. York | 35.000 | Siegrist Brothers | 60,000 |
| Wm. Hudson | 12,000 | C. Westfall | 12,000 |
| Mrs. Mills | 10,000 | Hurdman | 20,000 |
| Dr. Crane | 62,000 | J. T. Dewoody | 20,000 |
| General Keys | 30,000 | Capt. Phil. Christensen | 35,000 |
| Dr. Rule | 20,000 | J. Van | 20,000 |
| P. Pettet | 15,000 | Suscol | 30,000 |
| F. Kellogg | 20,000 | | |

Making a total of 750,000 vines for the above twenty-nine vineyards. There are also a great number of smaller ones, containing from 1,000 to 10,000 vines each, which, collectively, amount to 250,000, making an aggregate of 1,000,000 for the entire county. Estimating that 1,000 vines are planted to the acre, there are 1,000 acres in vineyards.

There appears to be considerable difference in the quality of the wine made from grapes grown in different localities. Those grown in the vineyard of Dr. J. N. Wood, near the soda springs, where he has about 5,000 vines of the grey Reisburg variety, are said to make a fine hock wine. The peculiar flavor of this wine, which excels that made of the same character in other portions of the State, is attributed more to the soil than to the fruit. The great fertility of Napa valley, and the facilities it enjoys for reaching a market by the railroad passing through it connecting with steamers running daily to San Francisco, have caused the land in the vicinity to more than double in value during the past three years. It is difficult to obtain farms here for less than $25 per acre, and some are held as high as $100 or more. There are few cattle or sheep raised in this valley, it being nearly all under cultivation. Its name is of Indian origin, being all that remains of a numerous tribe of aborigines who once inhabited it. They were nearly exterminated by the small-pox in 1838.

Napa city, the county seat, was founded in 1848 by Nathan Coombs, a pioneer settler in the valley. It is situated at the head of navigation on Napa creek, steamers plying daily between the city and San Francisco. A railroad connects at Suscol landing, six miles south of the town, for convenience of shipping at all stages of the tide. It is a flourishing town, containing many flower-gardens, vineyards and orchards, a number of substantial public buildings, including hotels, churches, schools, etc. It is lighted with gas, and supplied with abundance of good water, brought in pipes from the mountains. In addition to the railroad to Calistoga, a number of good macadamized roads, connecting with the interior of the county, have been made, or are in progress. This enterprising spirit of its residents has materially increased the business of the city during the past two years, and nearly doubled the value of its property. At the close of 1867, it contained about 1,900 inhabitants, of whom 500 were children; in 1864, its population was less than 1,000. The construction of a railroad through the upper portion of Napa valley, has created an active trade in firewood. The Napa Wood Company have purchased from the Federal Government nearly 15,000 acres of mountain land, covered with black oak and other trees, near Oakville, on the line of the road. In November, 1867, there were 3,000 cords of wood piled up here for shipment to San Francisco.

Calistoga springs, one of the most pleasant, convenient, and fashionable watering-places in California, are in this county, about twenty-six miles north of Napa city, with which place they are connected by the Napa valley railroad. They are situated in a romantic valley about three miles long and one mile wide, surrounded on all sides by towering mountains, the rugged outlines and steep declivities of which impart to the scene a wild grandeur. On the north, less than three miles distant, Mount St. Helena looms in gigantic proportions, black and grim, while all around are peaks but little inferior to it in altitude, and so steep that their sides appear almost perpendicular. Some of these mountains are covered with timber to their very summits, others remaining bare and bleak as when first created. The telescopic outline of these distant hills, on a warm summer's day, is among the marvels of the atmospherical phenomena of California. No English park is more beautiful than the plain that stretches between the town and

Mount St. Helena, covered with oak and sycamore forest-trees, arranged by Nature with such exquisite symmetry as art could never accomplish. A rivulet, formed by the water from innumerable springs on the hill-sides, flows through the valley. This water, owing to its chemical composition, is of pale blue tint, giving a singular charm to the region through which it flows. The soil around these hot springs, extending over nearly a mile of the valley, is as springy under foot as the quaking bogs in some of the Atlantic States, and is covered with a tough, wiry grass, which cattle and horses are exceedingly fond of. The springs nearest the hotel have been enclosed in capacious wooden tanks, set in the ground, the water bubbling up within them, clear and sparkling. Over several of these tanks, houses have been erected supplied with conveniences for bathing, with the water at any desired temperature.

The springs at Calistoga are supposed to be connected with the Geysers in Sonoma county, from which they are twenty-five miles distant. They differ in temperature from 75° to 200° Fah., and contain iron, sulphur and the various salts of lime, magnesia and soda. Several deep holes have been bored among these springs, with a view to obtaining pure water. At a depth of sixty-two feet, the water in one of these holes was so intensely hot as to break the bulb of the thermometer used to test it. The materials met with by the borer, prove this valley to be much older than the Geysers. The auger passed through sixteen feet of rich loam, resting on six feet of gravel, under which is a stratum of tufacious matter ten feet thick, and a bed of clay and gravel 29 feet thick; below this, was a stratum of rock too hard for the auger. The temperature of the water, six feet beneath the surface, was found to be 135°; at 22 feet, 195°; at 32 feet, 210°; below which point it was too hot to be tested with the instrument. In other holes, bored to a depth of 70 feet, the temperature increased about 3° for every ten feet sunk, the water being sufficiently hot at the lowest depth attained to boil eggs in a few minutes.

The greater portion of the valley in which these springs are located is the property of Samuel Brannan, Esq., one of the most enterprising residents of San Francisco, who has expended upwards of $100,000 in aiding Nature to further adorn this beautiful place. Ornamental trees, flowers and shrubs from almost every clime, have been gathered, 100,000 grape vines planted, mazy walks, cosy bowers, and labyrinthine groves laid out, without the appearance of having been planted artificially. In a spot so sheltered, with a soil so rich—always moist and warm—all the plants of the warmer latitudes grow with extraordinary luxuriance. The whole valley forms a sort of open-air conservatory, while, on the hills and knolls around it, the air is delightfully cool and balmy. The hotel and bathing accommodations are extensive and elegantly fitted up, including capacious tepid swimming-baths, for both sexes. The valley is not, however, wholly devoted to the use of the votaries of pleasure. A large tract of land has been planted with mulberry trees, to feed silk-worms; another tract has been planted with willow, for the manufacture of baskets. In the mountains, among the timber, is a steam saw-mill, where thousands of feet of excellent lumber is cut; and, on the lower hills, are vineyards and fruit orchards in a high state of cultivation. The career of the proprietor of one of the Calistoga vineyards, affords such an excellent illustration of what a "poor man," with no other capital than intelligence and industry, may accomplish in California, that we give some particulars about Schram, and his vineyard, as an example worthy of imitation. Schram is a German by birth, and a barber by profession. When he arrived in the State, less than seven years ago, he had neither money nor friends, and could scarcely speak our language; but he had tact and courage. Believing that the hill-sides around this valley would produce a superior quality of grapes, he procured a tract of the land for a trifle—being covered with timber and underbrush, it was not considered to be worth anything. By dint of hard labor, he cleared a few acres and planted them with vines, acting as barber at the springs on Saturdays and Sundays, in order to obtain money to pay his current expenses. He now has, at the end of five years, 15,000 vines growing, about one half of which bear fruit, from which he has made sufficient wine to pay for considerable improvements.

The White Sulphur springs are another fashionable resort. These are about six miles south of Calistoga, in the same range of mountains. They are in a deep gorge, so narrow that a strong man might throw a stone from one of the mountains that enclose it, to the other. A little babbling stream of clear, cold water ripples through the gorge over a pebbly bed, shaded by the foliage of broad oaks and drooping willows, forming quite a different scene to that about Calistoga. The waters are also different, issuing in a clear stream from the mountain side, at a temperature of about 80°. There are excellent hotel and bathing arrangements at these springs, but they are less frequented than Calistoga.

The Napa Soda Springs are situated about five miles north from Napa City, on the east side of the valley, in a branch of the same range of mountains as the other mineral springs in this and the adjoining counties, but nearly twenty miles south of any of those described. They are elevated nearly one thousand feet above the level of the valley, on the slope of the mountain. The number of springs must be very great, as they issue from the surface over an area of about thirty-five acres. Some of them discharge but little water—others are sufficiently large to keep an inch pipe constantly filled. Some merely ooze from the slate formation composing the mountain—others have formed basins around them by the sedimentary matter they deposit.

The liquid from the larger spring is a fine quality of natural soda water, highly charged with carbonic acid gas, and has become a popular beverage throughout California. Napa soda, obtained from these springs, is bottled and sold at the rate of five thousand dozen per month during the summer season. Small gasometers are placed over each of the larger springs, which collect the gas as it escapes with the water, after which it is conducted by means of pipes into the main gasometer, and then forced into the bottles under a pressure of forty-five to sixty pounds.

These valuable springs were discovered in 1853, but the water was not considered of commercial value until 1856. Since that time the demand for it has steadily increased. It is intended to erect a spacious hotel in the vicinity, so that those who desire to do so may imbibe the soda from the fountain head.

The waters of these springs have been frequently analyzed. From experiments made by Dr. Lanszweert, a practical chemist, a quart of it being evaporated, was found to contain 17.19 grains of solid matter, compounded of the following substances :

| | Grains. |
|---|---|
| Bicarbonate of soda | 3.28 |
| Carbonate of magnesia | 6.53 |
| Carbonate of lime | 2.72 |
| Chloride of sodium | 1.30 |
| Sub-carbonate of iron | 1.96 |
| Sulphate of soda | 0.46 |
| Silicious acid | 0.17 |
| Alumina | 0.15 |
| Loss | 0.62 |
| Total | 17.09 |

Oak Knoll, originally the property of J. W. Osborn, one of the most enlightened and enterprising among the pioneer farmers of California, and who spent large sums of money in cultivating and improving it, is now owned by R. B. Woodward. This farm, containing about eighteen hundred acres of fertile land, occupies the greater portion of a gently-rounded knoll, situated nearly in the center of Napa valley, about five miles from the city. Ancient white oaks of large size still flourish about it in all their pristine beauty, imparting to the spot a peculiarly venerable aspect. Broad fields of grain, luxuriant vineyards, and well-trained orchards tell that the useful has not been sacrificed to the ornamental or beautiful—all being blended with admirable taste and judgment.

On the boundary between this and Lake county, connecting with Mount St. Helena, is an irregular pile of steep and rugged mountains, extending as far as the head of Napa valley, in which large deposits of quicksilver have been found, some of which have been in process of exploration since their discovery in 1859. The indications of this metal have been traced for nearly fifteen miles from Sonoma, through Lake, into this county. About two miles south of Mount St. Helena, in a deep cañon, running nearly east and west, is a steep bank, on the south nearly eighteen hundred feet high, and about a mile in length, the most of which contains cinnabar, its slopes being covered with fragments that have fallen from the croppings above. Portions of this ore can be panned out from almost any of the surface dirt in this cañon, and small grains can be gathered from the serpentine and sandstone of which the bank is composed. There are two well defined ledges in this bank, about two hundred yards apart, the lower about eight hundred feet above the bottom of the cañon, trending northwest and southeast, which are richer in the ore than other portions. Another cañon, trending to the south, crosses that in which this bank is situated, and extends into James' cañon, trending northeast about two miles. Here the cinnabar crops out along the sides and over the summit of the mountain which divides this cañon from Pope valley. From its top, descending eastward into the latter for about two miles, the ores are richer and more abundant than in any other portion. The owners of the lead in this vicinity have expended large sums in prospecting their claim. In 1863 furnaces were erected and about twenty thousand pounds of mercury obtained, but the disconnected nature of the deposits, defective apparatus, and high price of labor and materials compelled the parties to cease operations.

During 1867 new and important discoveries of cinnabar were made in this vicinity, and several hundred tons of ore extracted, which yielded at the rate of from eight to thirty per cent. of metal. At the close of that year a considerable force of men were employed opening a number of claims here. A furnace capable of reducing eight tons of ore per day was put up, numerous buildings were erected, a dam and flume were built, and every preparation made for extensive operations.

Pope valley lies about forty miles north of Napa city. About ten miles north from this place, between Berreyesa valley and Clear Lake is another locality abounding in cinnabar, though the ore differs from that in Pope valley, it being of a leaden-gray color, while the other is a red ore. Traces of gold are found in the ores at both places. The native Californians were aware of the existence of these deposits before their discovery by Americans—these people designating them as "la veta madre," or, the mother vein.

The population of Napa county in the fall of 1867 numbered about 8,000, chiefly Americans and Europeans, or about one inhabitant to each fifty-nine acres. In 1860 it contained 5,500.

### LAKE COUNTY.

Lake county is bounded on the north by Colusa and Mendocino, on the south by Napa and Sonoma, on the east by Colusa and Yolo, and on the west by Mendocino and Sonoma. It is about sixty miles in length by fifteen miles in average width. The whole of it is embraced within two branches of the main coast mountains, running nearly north and south, which divide on the south of Mount St. Helena, the western branch being known locally as the Mayacamas, (the name of a once numerous tribe of Indians that inhabited them,) and the eastern as Bear mountains, from the number of grizzlies living there. Mount Ripley, the highest peak of this division, near the upper end of Clear Lake, is upwards of three thousand feet high. These divisions reunite near the northern limit of the county, where Mount St. John, the connecting ridge, attains a height of nearly four thousand feet. Between these ranges lies a valley about forty miles in length by nearly fifteen miles wide, the sides of which are formed by narrow ridges of broken mountains, separated by deep gorges and narrow cañons, covered with timber underbrush, wild oats and grapes, in which all kinds of game abound. A grizzly bear was killed in these mountains in 1865, weighing nearly two thousand pounds. In this valley is Clear Lake, covering more than one third of its surface. This beautiful lake is nearly one thousand five hundred feet above the level of the sea, is sixty-five miles from Suisun bay and thirty-six miles from the Pacific ocean. It has a length of about twenty-five miles, and for the first ten miles from its northern end averages ten miles in width, after which it is contracted to a width of about two miles—the base of a mountain called Uncle Sam projecting into it at this pofnt, and dividing it into the upper and lower lake. This mountain rises almost perpendicularly from the water to an altitude of two thousand five hundred feet, and to the southeast, a distance of eight miles, the lake contracts into Cache creek, its only outlet, a deep, wide stream, which flows eastward through Yolo county for sixty miles and unites with the Sacramento, near Knight's landing. The Cache creek valley, a very fertile district, extends through this county into Yolo. Hawkins' arm of the lower lake, as the narrow portion is termed, is about two miles wide, and extends east among the mountains a distance of six miles. North of Uncle Sam mountain, the main lake is, in places, more than nine miles wide, but owing to the peculiarly clear atmosphere which usually prevails, the distance appears much less. Its waters are clear as crystal, cool and deep, and the upper lake, from one end to the other, full of fish, and unbroken by a single island. The narrow portion contains several beautiful little islands, inhabited by Indians, who call the lake Lup Yomi. These Indians are a poor, harmless, and apparently happy set of beings, who live on roots, fish, and game—which latter they exibit great dexterity in catching—the fish with net, and the wild fowl with slings, in which they use small pellets of hard baked clay. They can hit a duck with these pellets as unerringly as white men can with a shot gun. The canoes used by these people, made of tules dried and bound together, are precisely similar to those described by Cabrillo and Father Palou, and alluded to in the historical portion of this work. Pike, trout, and blackfish are abundant in the lake, and ducks, geese, and other wild fowls may be found in the tules which fringe its shores.

North-west of Uncle Sam mountain, is a belt of fine bottom-land, known as Big valley, which, rising gradually from the border of the lake, extends to the head of the main valley, and is nearly two miles wide, thickly sprinkled with oak and willow, and traversed by numerous small streams, which empty into the lake. On this plain is located Lakeport, the county seat, about one hundred miles north from San Francisco—a quiet, prosperous little town. There is twenty feet of water close to the shore at this place; and a small sailing vessel plies between it and the lower lake. It is contemplated to construct a small steamer, to facilitate freight and travel between these two points. There are two grist-mills and three saw-mills in this valley, which are kept busy supplying the district with flour and lumber. The mountains furnish abundance of redwood, pine and fir.

The eastern shore of the lake is quite mountainous; but, towards the north, the range is much broken, and several creeks flow through cañons into the lake. Along the banks of these creeks, and at other places near the shore, are considerable patches of rich grazing land, affording nutritious pasturage for a large number of cows. Some of the cheese made here is reputed to be equal to the best English Stilton, or Cheshire. There are six large dairies in this valley, having sixty to one hundred and fifty cows each. The annual product of the county, for the past four years, has been about 200,000 pounds of cheese, each cow giving enough milk to make about 300 pounds during the year.

There are good roads from Lakeport connecting with Suisun, Mendocino, and Napa counties. It is proposed to extend a branch of the Napa valley railroad, to the head of Lake valley. A road has also been surveyed to connect with the Geysers, only ten miles distant.

There are numerous small branch-valleys among the surrounding mountains, some of which have been brought under cultivation within the past year or two. Sigler valley, a few miles west of the head of Lake valley, is one of the finest of these little places. It is about five miles in circumference, surrounded by mountains of the most picturesque form. One of these mountains, from which the valley receives its name, contains a large number of springs, varying in temperature from icy coldness to a boiling heat, of different colors and flavor, including one of cold soda-water. A hotel has been erected in this valley, for the accommodation of visitors.

This county was organized in 1861; until then it formed the northern portion of Napa county. Its first white settlers were Lease, Kelsey, and Stone, who had a cattle-ranch in Lake valley, in 1844. The two latter were killed by Indians in 1851. The present population of the county is about 4,000, including 1,200 children. There are several small villages located along the shores of the lake and among the valleys. The land under cultivation in 1867, exceeded 7,000 acres, from which good crops of wheat, barley and vegetables were raised, but little attention being paid to fruit. Experiments made recently demonstrate that a good quality of cotton can be grown in the sheltered valleys. Good land in this county is held at twenty to fifty dollars per acre.

One of the more considerable sources of wealth in this county consists of its borax and sulphur deposits, both of which abound in great profusion and purity in the vicinity of Clear Lake. Borax lake, or Lake Kaysa as it is called by the Indians, a pond covering from two to four hundred acres, according to the season of the year, is situated a short distance east of Clear lake, about half-way between Cache creek and Hawkins' arm, in a valley formed by two steep ridges at the head of Cache creek. Borax lake is situated on a sort of peninsula extending into Clear lake, being separated from the latter by a cretaceous ridge varying from half a mile to one mile in width. In the fall of the year, when filled up by the rains, this pond is about six thousand feet long and two thousand wide. It is of an irregular, oval shape, its longitudinal axis lying east and west, and in ordinary seasons varies in depth from five feet in the month of April, to two feet at the end of October. The appearance of the land to the eastward, indicates that this lake at one time extended a mile in that direction beyond its present limit, wells sunk in this land filling with water similar to that in the lake, which has no visible inlet or outlet. The waters of this pond contain a considerable per cent. of borax, carbonate of soda and chloride of sodium in solution; yet it is not from this water that the supply of borax is obtained. Beneath, lies a bed of black jelly-like mud, three feet in depth, which feels like soap between the fingers. This mud contains enormous quantities of the crystals of biborate of soda. Underlying it is a bed of tough bluish clay, from five to twelve feet in thickness, and which also contains numerous layers of these crystals, mostly of a larger size. The latter are semi-transparent and of a grayish or brownish tint, being contaminated more or less with earthy matters. These crystals are collected and dissolved in boiling water, when the impurities fall to the bottom of the vessels, and they re-form in a state of nearly absolute purity and of almost snowy whiteness.

From experiments made by the California Borax Company, who own this lake, it has been ascertained that the water, mud and clay, to a depth of sixty feet—as far down as they have tested them—are heavily charged with this valuable salt, as well as a large percentage of carbonate of soda, and chloride of sodium. Professor Oxland, who for some time had charge of the company's works, found the black mud to contain, by analysis, 17.73 per cent. of borax. Another sample analyzed by Mr. Moore, a chemist of San Francisco, yielded 18.86 per cent. of this salt. The clay, at the depth of eight feet has been found to contain 15, and that taken from a depth of sixty feet, 3.51 per cent. of borax. The prepared borax produced by this company is made from the crystals alone, these being ample to supply all the crude material required for present operations, the quantity purified amounting to between twenty-five hundred and three thousand pounds daily.

Until 1866 the only apparatus employed to obtain the borax consisted of four iron coffer dams, six feet square and nine feet deep, which, having been floated to the spot where required, on a raft, were sunk through the mud by their own weight into the mud beneath, after which they were pumped out and the mud was removed and placed in cisterns to be treated as already described. Latterly a dredging machine has been employed, which not only expedites operations, but curtails expenses.

This lake was discovered by Dr. John A. Veatch, in September, 1859. About two miles to the north of it, on the edge of Clear Lake, is a group of boiling springs, scattered over an area of about eight acres, the water of which is highly charged with boracic acid, soda and chlorine. From a gallon of this water Dr. Veatch obtained, by analysis, four hundred and forty-eight grains of solid matter, consisting of borax, carbonate of soda, chloride of sodium, and silicious matter. One of these springs discharges nearly one hundred gallons of water per minute, the quantity issuing from the entire number being about three hundred gallons per minute, but which is here suffered to run to waste, because of the abundance of more available material at hand. The water of these springs contain the following elements:

| | |
|---|---|
| Bicarbonate of soda | 76.96 |
| Bicarbonate of ammonia | 107.76 |
| Biborate of soda | 103.29 |
| Free carbonic acid | 36.37 |
| Chloride of sodium | 84.62 |
| Iodide of magnesium | .09 |
| Alumina | 1.26 |
| Silicic acid | 8.23 |
| Matters volatile at red heat | 65.77 |

And traces of sulphate of lime, chloride of potassium, and bromide of magnesium.

These substances being calculated as anhydrous salts and borax, containing forty-seven per cent. of water when crystalized, causes 103.29 grains in the above analysis to be equal to 195.35 of commercial borax. There are probably no springs in the world which contain so large a per cent. of ammoniacal salts as these.

There is another borax-lake situated in a little valley a few miles northeast of Clear lake, surrounded with thick forests of oak and pine. The bottom of this lake, which covers an area of about twenty acres with a clay similar to that found in the larger lake; and, although its waters are more highly charged with boracic acid, the crystals of the borate of soda have not as yet been found in its bottom. Besides the springs already mentioned, there are several others of less magnitude in this county, impregnated with the salt of borax.

On the shore of Clear lake, near the hot borate springs before noticed, is an immense deposit of sulphur, from beneath which these springs appear to flow. This bank, which covers an area of about 40,000 square yards, is composed of sulphur that appears to have been concreted into a solid mass—splintered and fissured in innumerable places, from the vapors constantly arising from these springs. Any object placed in the latter is speedily covered with crystals of this substance. Considerable quantities of sulphur from this place have been refined and used by chemical works, and in gunpowder, match and other factories.

In purifying this article, it was found to be impregnated with mercury to a degree that imparted to it quite a dark color; a defect, however, that was readily obviated. On being worked, it is found to yield seventy to eighty per cent. of pure brilliant sulphur. The company refine from six to ten tons of sulphur per day. The demand for this article, for home consumption, amounts to about twelve hundred tons annually in this State, of which five hundred tons are required by the chemical works, six hundred by the powder-mills, and one hundred for making matches, etc.; the most of that obtained in California being from deposits in Colusa county. Its market value is $50 per ton in San Francisco; but so abundant is this article in the mountains extending north from this bank in Lake county, to Tuscan springs in Tehama county, that the supply must always be out of all proportion to the demand, there being a sufficiency here to meet the requirements of the world for centuries to come. There are a number of small beds of salt in this county, but their contents, although quite pure, are only used to supply local wants. Gold and silver-bearing lodes have been found in Luckanome valley, and also near Red river in this county, from some of which very satisfactory assays have been discovered. Silver ore, assaying as high as $50 to the ton, has been discovered in Sigler valley, and also at a point near Lakeport, while copper and cinnabar occur at various localities, the most promising deposits of these metals having been found near Knoxville, at the head of Berreyesa valley.

Petroleum is collected, in small quantities, from the surface of many of the small lakes and pools among the mountains, though little or nothing has been done towards tracing this substance to its source.

Marble, pumice stone, and sulphate of lime, occur abundantly at many localities in the county.

## MENDOCINO COUNTY.

This county derives its name from Cape Mendocino, the most western headland in the State, formerly included in this county, but now a portion of the adjoining county of Humboldt.

Mendocino is bounded on the north by Humboldt, on the east by

Colusa and Lake, on the south by Sonoma, and on the west by the Pacific ocean. Its length, extending north and south, is about eighty miles, its average width about forty miles. It covers an area of upwards of 2,000,000 acres, of which 900,000 are fit for cultivation, and 200,000 are good grazing lands, the balance being composed of rugged hills and lofty mountains. At the close of 1867, there were 100,000 acres enclosed, of which 60,000 were under cultivation.

The main topographical features of this county consist of two parallel ranges of the coast mountains, extending in a direction nearly north and south through its entire length. Between these ranges are a nearly continuous chain of valleys, through which flow the Eel and Russian rivers, the two largest streams in this section of the county, both having their sources in the Mayacamas mountains, in the vicinity of Potter's valley, on the eastern border, and nearly in the center of this county. Eel river, flowing northward through this and Humboldt county, empties into the Pacific ocean near Centerville, a short distance from Humboldt bay. In December, 1867, a bill was introduced in the State Legislature, requesting the Federal Government to direct the officers of the Coast survey to make a thorough examination of the mouth of this river, with a view to ascertaining what measures, if any, should be adopted to improve its navigation. A small schooner made several trips a short distance up this river in 1866, showing that it is navigable, to some extent at least. Russian river, flowing southward through this and Sonoma counties, empties into the Pacific ocean near Fort Ross. There are a great number of tributaries to both of these rivers, which, having their sources in the surrounding mountains, and flowing through the main and lateral valleys, cause Mendocino to be one of the best-watered counties in the State, and furnish it with almost unlimited power for the propulsion of machinery.

In the range bordering the coast, there are upwards of twenty streams, many of them of considerable volume, though but few miles in length, which flow westward into the Pacific ocean. Many of these are employed by lumbermen for running saw-mills, floating logs from the mountains, and for shipping the lumber and other produce from the adjoining valleys. The mouths of nearly all of these streams form estuaries, affording safe harbors for coasting vessels.

From Shelter Cove on the north to Havens' anchorage on the south, a distance of more than one hundred miles, the outer Coast Range is covered with an almost unbroken and nearly impenetrable forest of redwood and pine, extending inland from fifteen to thirty-five miles. In this region are located seven large saw mills, which cut and shipped during the year 1867, forty-six million feet of lumber, and nine small mills, which turned out over two million feet, chiefly for local consumption. A large quantity of posts, rails, railroad ties, pickets, shingles and other split lumber, are also shipped from the different landings. The lumber trade of this region is the chief resource of the county, giving employment to nearly one half of its population and to about forty schooners of from one hundred to two hundred tons burden. The following particulars concerning the largest of these mills will convey an idea of the proportions and manner of conducting the lumber business in this county: The Albion mill, at the mouth of Albion river, the property of Messrs. McPherson and Wetherbee, is run by steam and cost $30,000. During 1867 its owners cut and shipped to San Francisco six million feet of sawed lumber. This firm also owns the Noyo steam mill, at the mouth of Noyo river, about twenty miles further north than the Albion, which cost $35,000, and from which they shipped in 1867 seven million feet. It was at this mill that the extraordinarily large redwood plank, now on exhibition at the Department of Agriculture, Washington, was cut—one of the largest planks ever cut by a mill in any part of the world, measuring seven feet five inches in width, by twelve feet in length, and four inches in thickness. These are good specimens of much of the lumber made in this district, being free from knots or blemishes of any kind, and cut as smooth and even as slabs of marble. There are thousands of redwood trees in the forests here measuring from fourteen to eighteen feet in diameter at six feet above ground, and without a knot or limb for one hundred feet from their roots up.

The Walhalla steam mill, on Walhalla river, owned by Messrs. Haywood & Harmon, costing $30,000, cut and sent to market 4,000,000 feet of lumber in 1867; Stickney & Coomb's steam mill, on Little river, costing $20,000, cut and shipped over 5,000,000 feet; Tichenor & Bixbey's steam mill, at the mouth of Novarro river, costing $30,000, cut and shipped 6,000,000 feet; and J. G. Jackson's steam mill, on Caspar creek, costing $30,000, cut and shipped 6,000,000 feet in 1867. The Mendocino Mill Company, at Mendocino City, has a steam mill which cost $60,000, and cut 12,000,000 feet of lumber in 1867. The other mills in this county are of small capacity, and mainly run by water power. Each of the principal mills is located near the mouth of a creek or river, near tide water, convenient for loading vessels—such creeks or estuaries occurring at irregular intervals of ten or fifteen miles along the whole coast of the county, and affording unusual facilities for conducting an extensive lumber trade.

It is an astonishing sight to those not acquainted with the business to see the immense saws pass through these mammoth logs. Many of the latter are from ten to fifteen feet in diameter, from twelve to sixteen feet in length, and are handled by the machinery used with great celerity and facility. In a few minutes they are ripped into hundreds of boards and scantling—ready for shipment. It requires the services of several men to remove the lumber as fast as a gang of two saws running on these enormous logs will cut it. The large mills here make about eleven working months in the year, one month in every twelve being required for repairing and keeping the mill in order. When driven with work they sometimes run night and day, but never on Sundays. The logs are cut in the summer, and after lying till they dry and become light and more easy to handle, are hauled to the banks of the streams—many of them at this season dwindled to rivulets—and rolled into their channels, where they remain until the streams become swollen by the winter rains, when they are floated down to the mills, a little above which booms are rigged for catching them.

This timber land is all a part of the public domain, and so extensive are these forests that the millmen rarely ever go to the trouble of reducing any portion of it to possession, each man cutting in the vicinity of his mill without molestation or question. So abundant is the supply that it is not likely to suffer serious diminution during the present generation. This lumber, delivered in San Francisco, sells at about twenty dollars per thousand feet for rough, and thirty dollars for dressed. At the lowest figure named, the value of the lumber made in Mendocino county, and shipped thence during the year 1867, amounted to the sum of $9,600,000.

Lying east of the timbered mountains is a tract of open country known as the Bald Hills, they being nearly destitute of trees, though covered with wild oats, clover and other grasses affording an abundant pasturage. In the main Coast Range of mountains, which traverses the entire western part of the county, there are a number of bold peaks, some of them nearly six thousand feet high, but few of them having as yet received a name. Near their summits these peaks are bare and rugged, or covered only with chaparral, though oaks and various other trees grow about their base. The country everywhere abounds with grizzly bears, deer, elk, and other game, very little of it yet being settled, or in fact fully explored. The entire region, reaching from the Hay Fork of Trinity river to the head of Russian river, a distance of nearly one hundred and thirty miles, remains an almost uninhabited wilderness, though its agricultural and grazing resources are known to be immense. The reason so little settlement has been made in this extensive and inviting tract is, there are no roads by which it can be approached from other parts of the State—the hostile character of the Indians, who, until a few years since, possessed it, having also tended to keep out immigration. Lying between the main ranges of mountains are several extensive and fertile valleys, within the limits of this county. In these valleys most of the farming population resides, and here three-fourths of all the grain, fruits and vegetables produced in the county are raised.

Commencing with Ukiah, a part of the main Russian river valley, and which extends south fifteen miles into Sonoma county, we have adjoining it, on the north, Coyote valley, three miles long by one and a half wide, connecting with Potter's valley, six miles long and two wide. Twenty miles north of Ukiah is Little Lake valley, beyond which to the north is Sherwood's valley, and nine miles further on, Long valley—all containing a considerable quantity of good land, and offering tempting inducements to settlement. Round valley, sixty miles from Ukiah, lies in the northern part of Mendocino, extending into Humboldt county. Around these larger are numbers of lateral and subordinate valleys, the most noteworthy of which are Anderson's, Redwood, Sarral, and Eden Spring, each containing a fair share of good land. As Little Lake valley fairly represents the entire group, we select it for a somewhat more detailed description. This pleasant spot, deriving its name from a small, deep lake of pure water, reposing among the rocks at its southern end, is six miles long and three wide. It is sheltered on every hand by a grand amphitheatre of heavily wooded mountains, from which a number of streams of clear water descend into the valley. The base of these mountains is covered with grass, and there are several thousand acres of good land in the valley, which, though not discovered until 1853, contained, four years after, about fifty families, who managed to maintain themselves in comfortable independence, cultivating about 3,000 acres of its fertile soil. When first discovered, this valley was inhabited by three tribes of Indians, who subsisted upon the fish, game, wild fruits, and seeds found in and around it.

The climate of these valleys is more humid, and owing to their greater elevation, somewhat colder than that of the valleys further south and east. The ocean-fogs, passing over the lofty timbered ranges to the west, cause frequent showers during the summer, which tend to keep vegetation green and prevent the larger streams from drying up, as they are apt to do further south, while the snow-capped peaks in the Coast Range to the east, absorbing the heated air from the plains, render the summer climate of this region much cooler than in the great interior and southern valleys.

Corn, hemp, and tobacco, grow vigorously, and never fail to mature in these valleys, while all the more hardy plants and fruits flourish with little other culture than the mere act of planting. The peach, however, does not thrive so well here as in warmer localities, and the grape requires to be planted on the sunny side of the hills in order to reach perfection. Most of the soil in these valleys, formed chiefly from the disintegration of the volcanic rocks of which the country around is largely composed, consists of a black, sandy loam, very favorable to the growth of the cereals, as well as most kinds of fruits. The greatest fruit-growing localities are Anderson and Ukiah valleys, in the southern portion of the county. Mendocino having been so recently settled, few of the orchards have yet attained to any great size. There were raised in this county, during the year 1867, 20,000 bushels of wheat, 65,000 of barley, and 260,000 of oats. It contains seven grist-mills, at which there were manufactured 14,000 barrels of flour—a sufficiency for home consumption, considerable quantities of potatoes, butter, cheese, eggs, lard, ham and bacon, are also produced in this county, the soil and climate being peculiarly well adapted for the culture of the potato, while the abundant pasturage causes the cows to yield much milk, and the mast afforded by the wide range of oak-forests supply a cheap and nourishing feed for the hogs, imparting to their flesh an excellent flavor. The produce from the southern part of the county, is sent to San Francisco and Sacramento, by way of Sonoma; that from the more northern districts being shipped by sea. A good road was completed in the fall of 1867, between Ukiah and Lakeport, a distance of twenty-four miles, which, by establishing wagon communication between this valley and the routes leading to San Francisco, has greatly promoted the interests and convenience of the inhabitants, the development of the agricultural resources of this section of the county having been retarded through a want of wagon-roads.

Though its boundaries were prescribed as early as 1850, Mendocino, owing to the sparseness of its population, was not organized as a county until 1859, it having in the interim been attached to Sonoma for legal and judicial purposes. Besides its isolated position, protracted and harassing wars with the Indians, who, after committing depredations on the whites fled to the mountains and wilderness beyond the reach of their pursuers, have operated to delay the settlement of this county. The Federal Government has at length succeeded in collecting the remaining Indians on two large reservations—the one at Round valley, in the north-eastern part of the county, and the other on Noyo river, on the coast near the middle of the county. These reservations contain upward of 100,000 acres of good land, on which the Indians, under white supervision, raise enough grain and vegetables for their own support. These hostile tribes are now so thoroughly subjugated, not only in this but throughout the other northern coast counties, as to be no longer a cause of alarm to the whites, whose number has considerably increased since the savages were gathered upon these reservations. In 1860, there were only 1,498 white inhabitants in this county; at the close of 1867, there were 8,176, including 2,500 children under fifteen years of age.

Ukiah City, the county seat, is situated on the main Russian river, on a beautiful undulating plain, well timbered with oaks and willows, and sheltered on the east and west by lofty mountains. Three handsome rivulets, flowing from Potter's, Little Lake and Walker's valleys, empty into Russian river just below the town, the scenery in the neighborhood being wonderfully bold and picturesque. The place derives its name from the Eukio, or Yukio tribe of Indians, who dwelt in the valley when it was first discovered. It is the trade center of an extensive agricultural district, the importance of which will be much enhanced when it comes to be connected with Napa valley by means of a railroad, which it is thought may be effected in the course of a few years. The town, having a population of about four hundred, contains several good brick and stone stores, a neat court house, with a schoolhouse, church and other public buildings. Land is cheap in the central and northern portions of this county—the price of good improved farms varying from five dollars to twenty dollars per acre.

Mendocino City, the most important coast town in the county, stands on the north shore of Mendocino bay, at the mouth of Big river, or Rio Grande, one hundred and twenty-eight miles northwest from San Francisco, in the midst of the most extensive redwood forests on the Pacific coast. Besides being a shipping point for large quantities of lumber, it is the outlet for a large area of open country lying east of the heavy timber belt known as the Bald mountain, a portion of which extends for several miles along Big river, and also for nearly twenty valleys lying in that quarter, most of which are connected with this point by wagon roads. Mendocino, which has a good depth of water and convenient wharves, contains four hundred and seventy inhabitants, being the most populous town in the county.

There are known to be valuable deposits of minerals and metals in this county, though little has yet been done towards their development. In 1864, a ledge of partially decomposed auriferous quartz was discovered in the mountains near Ukiah City, and from which the discoverer extracted several thousand dollars. In November, 1867, further discoveries of gold bearing quartz were made in the mountains, thirty miles northeast of Ukiah. In October of the same year, samples of ore taken from an argentiferous lode found on Eel river, yielded, by working test made in San Francisco, at the rate of $49 50 per ton—several auriferous lodes and some placer diggings, having been found in the same vicinity. In 1863–4 considerable placer mining was carried on in the neighborhood of Calpella, eight miles north of Ukiah, other mines of this class having also been worked on the north fork of Big river, twenty miles from Mendocino City, as well as still further north, about the base of the Yalloballey mountain, in Trinity county; and when it is considered that the same range in which the rich placer mines of Trinity are situated extends south into Mendocino, there is good reason to believe that still further and more important discoveries will yet be made in this county also.

Copper ores have been met with at several points in this county, the more promising deposits being in the hills near Coyote valley, eight miles north and fifteen miles north-east of Ukiah—in Potter's valley, Walker's valley, etc. Petroleum springs are found at several places in the county, many of the settlers collecting it from the surface of the pools, and burning it without any purification. At Punta Arenas, where this substance exudes from a sandy shale on the sea shore, a considerable amount of money was expended, in the spring of 1865, in seeking after more permanent deposits, but without any marked success. Sulphur and salt are common minerals in the county, and hot springs are numerous. Within half a mile of the county seat, there is a spring of natural soda water, which, if situated in a more populous district, or near a large city might be made to yield a handsome income.

## NORTHERN COUNTIES.

### HUMBOLDT COUNTY.

Humboldt county was organized in 1853, from portions of Trinity and Mendocino counties, and is named after the famous German savant and traveler, Baron von Humboldt. Cape Mendocino, the most western portion of the State, lies near the center of the county on its western border. Humboldt county is bounded on the north by Klamath, on the east by Trinity, on the south by Mendocino, and on the west by the Pacific ocean. It is fifty-six miles long, north and south, and fifty miles wide, containing 1,800,000 acres of land, of which about 500,000 are suited to agricultural, and 300,000 to grazing purposes, there being about 5,000 acres of swamp or overflowed land near tide-water. Much of the county is covered with the outlying spurs and more westerly ranges of the coast mountains, which, near the coast, are clothed with heavy forests of redwood, spruce, and pine. The timber-belt, varying in width from eight to ten miles, recedes from the coast, in some places in this county, a distance of several miles, leaving at these points an elevated terrace, or a sandy beach, destitute of timber. Humboldt bay, in the north-western part of the county, is a spacious, landlocked harbor, in which large-sized vessels may enter and lie with safety. This beautiful harbor, which has a good depth of water in most parts of it, is thirteen miles long and from one and a half to five miles wide, being narrow near the middle and expanding into a circular harbor at each end. It is popularly supposed that this bay was first discovered from sea in April, 1850, and by land in 1849; but it appears from a Russian work, published in 1848, containing a chart on which it is laid down, and which purports to derive its information from colonial documents of the Russian-American company, that it was discovered by citizens of the United States in 1806, an American vessel engaged in the fur-trade having entered it that year. The principal streams, discharging into the sea and bay within the limits of this county, are the Mattole, Bear, Eel, Elk, and Mad rivers. By the removal of obstructions near the mouth of Eel, it could probably be rendered navigable for some distance—a sloop of one hundred tons' burden having already passed up it for five miles; small vessels also succeed in running up the Elk for several miles. None of the other streams mentioned are navigable or susceptible of being rendered so, nor do any of them expand into estuaries at their outlets, forming coves into which small vessels can enter and load, as in Mendocino county.

The most westerly branch of the Coast Range is rugged and broken within the limits of this county—Mount Pierce, one of its highest peaks, being 6,000 feet high. Cape Mendocino and "False cape," six miles to the north, are formed by the projections of spurs, striking from the main Coast Range at right angles. That forming "False cape" continuing inland, constitutes the divide between Eel and Bear valleys; the other uniting with and forming part of the buttress of Mount

Pierce. The more easterly ridge of the Coast Range, forming the boundary between this and Trinity county, also rises in some places to a considerable height; Mount Balley, one of its peaks, being 6,357 feet high, while several lesser elevations attain an almost equal altitude.

Interspersed among these several ridges and spurs of the coast mountains, are many fertile valleys, hilly districts and rolling prairies covered with the native grasses wild oats, and other vegetation, rendering them the favorite resort of bears, elk, deer, and other game; presenting to the herdsman one of the finest pastoral regions in the State. The scenery here differs much from that met with further south, as well as in the Sierra Nevada. The mountains, though numerous and steep, are not so high or barren as there, while the forests, consisting of spruce and maple, have in most places a heavy undergrowth of wild shrubs, brambles, berry-bushes, and gigantic ferns.

Diagonally across this wild and broken, but rich and beautiful region, run the Mad and Eel rivers, pursuing their course towards the north-west, about twenty miles apart, and entering the ocean—the former about six miles north, and the latter seven miles south of Humboldt bay. Each of these streams has numerous small branches which serve to water a large expanse of country, and supply an extensive power for the propulsion of machinery, which will no doubt be largely availed of when the country is more fully settled.

The valley of Mad river, and its tributary branches, contain much good land, a portion of which has been brought under cultivation during the past three years. Eel river valley, the largest in the county and which also contains a fair proportion of good land, has been settled to some extent. Its soil is productive, and especially well adapted to the growth of the cereals, potatoes, etc. Seventy bushels of wheat, weighing sixty-one pounds to the bushel, and over one hundred bushels of oats weighing forty-four pounds to the bushel, are often produced to the acre, while fifteen tons of potatoes to the acre is not an unusual yield. Flax also grows to a large size, yielding two crops a year, with great weight of seed. The humid atmosphere favors the growth of this and other textiles, rendering the stalk vigorous and the fibre heavy and strong. The salmon-fishery at the mouth of this river, is the most prolific in the State; and the fish are said to have a finer flavor than those caught either to the north or south of this point. The annual catch here, which ranges from eleven hundred to three thousand barrels, might be greatly enlarged were there more of a local consumption, or better facilities for shipping the fish to a market. At present, all sent away have to be hauled to Humboldt bay, at considerable loss of time, risk, and expense.

The settlers in Bear river valley, keep many cows, and engage quite extensively in butter and cheese-making, a branch of business largely carried on in some other parts of the county. The Bald hills, portions of which lie adjacent to Bear valley, afford, throughout the entire year, an abundance of the most nutritious kinds of pasturage.

The lofty headland of Cape Mendocino, projecting into the ocean, renders the climate along this part of the coast more cool and humid than it is further south; the rainfall on Eel river, besides being more evenly distributed throughout the year, is nearly twice as great as at San Francisco, promoting vegetation and keeping the grass green most of the summer. A first-class lighthouse, recently erected on this cape, was nearly finished in the fall of 1867, during which year this structure no doubt would have been completed but for the wreck of the U. S. steamer *Shubrick*, which occurred near the spot, in October of that year, while engaged in transporting material for its use.

The scenery in the vicinity of the cape is very fine, both marine and inland. Mount Pierce, with its rocky spurs piled up in wild confusion, extends to the famous headland. Among the rocks and reefs along the shore, covered with moss and algæ, the waters seethe and foam, while the dark forests cast their shadows over the adjacent mountains.

Humboldt bay is the center of an immense lumber trade, while on its shores quite a large amount of ship building is carried on. In 1867 there were nine saw-mills in this county, and another of large capacity in course of construction. The following figures indicate the amount of lumber cut at the larger of these establishments during the year 1867: the Bay mill, Dolbeer & Carson proprietors, and Vance's mill, cut 5,000,000 feet of lumber each; two mills belonging to Jones and Kentfield, cut, the one five and the other 6,000,000 feet; the several smaller mills, located in different parts of the county, cut, collectively, about 4,000,000 feet, making a total of 25,000,000 feet, besides which there were a large quantity of posts, shingles and other split lumber, sent from the county. These mills afford employment to nearly a thousand men, and steady freight for ten or twelve schooners of two hundred tons burden each, in transporting their lumber to San Francisco. The most of these schooners were built on the bay. Vessels frequently load here for foreign ports, some of this lumber being shipped direct to China, Australia, the Sandwich islands, and Central and South America.

General U. S. Grant was stationed at Fort Humboldt, at the head of this bay, in 1853–4, during which time he was promoted to a captaincy. At that period there were numerous tribes of exceedingly warlike Indians in that region, who were finally subdued only after much hard fighting, and not until nearly three-fourths of them had been killed by the whites. The survivors have since been collected upon reservations, and for the past few years the settlers have been free from their molestations. Many of the Indian children having been trained up to habits of industry, make excellent herders and farmers.

There is much good farming and grazing land, not only in the smaller valleys adjacent to Humboldt bay, but also in a region lying east of the timber belt known as the Bald hills, which, being covered with wild oats, clover and other grasses, afford immense quantities of pasturage. On this, a small number of sheep and cattle are now grazed, though vast herds might here feed and fatten almost without the care of man. Over fifty thousand pounds of wool were shipped from this county in 1867. Considerable quantities of butter and cheese were also produced, the most of which was required for home consumption.

Mattole, a fertile valley lying to the south of Cape Mendocino is so sheltered from the prevailing westerly winds that its climate is several degrees warmer than that of the country to the north. Good crops of all kinds of grain, fruits and berries are easily raised in this valley, to which agricultural operations are mostly confined, the hills being devoted to grazing. The Mattole river, abounding with salmon and other fish, after flowing through the valley with a rapid current, creating an extensive water power, enters the ocean ten miles south of the cape. There are about five hundred settlers in the valley, who have built up comfortable homes, with school-houses, churches, mills, and other evidences of progress and thrift.

The want of good roads connecting this county with the great Sacramento valley, and with the country lying south, has greatly tended to retard its settlement—immigrants having no way of reaching it except by sea, which does not admit of their taking their families, flocks and farming implements with them without great trouble and expense. Recently the inhabitants have been considering the policy of extending county aid towards building roads leading in such directions as seemed most likely to facilitate immigration. The excellence of the climate, the abundance and cheapness of good land, and freedom from Mexican grants render this one of the most desirable regions open to settlement in the State.

Eureka, the county seat of Humboldt, is situated on the east side of the bay, six miles from its entrance. It is surrounded by a dense forest of redwood, and is the principal seat of the lumber trade and ship building on the bay. It was founded in 1851, is a thrifty and growing town of about sixteen hundred inhabitants, contains a flourishing academy, several good school-houses and churches, and numerous well-built private dwellings. In boring an Artesian well near this place, from which a copious supply of fresh water was obtained, though situated but a few hundred feet from the bay, the augur, at a depth of one hundred and forty-two feet, passed through the rotten trunk of a redwood tree.

Arcata, at the head of the bay, with which it is connected by means of a wharf two miles long, stands on a handsome plateau, sixty feet above tide water. It contains seven hundred inhabitants, and is the center of a considerable trade with the back country, and with the mining districts on the Klamath, Trinity, and Lower Salmon rivers, there being a good wagon road connecting it with Weaverville, the county seat of Trinity county. Many of the merchants own their own pack animals, with which they convey goods over routes not practicable for wagons, some of these leading over long routes through high and rugged mountains, in many places covered with gloomy forests. The land about Arcata is extremely well adapted to the culture of potatoes, many of which, of an excellent quality, are raised and shipped to San Francisco. Two hundred thousand sacks (400,000 bushels) of potatoes were sent from this county in 1867, one half of which were raised in Arcata township. The average yield of these vegetables is at the rate of about two hundred and twenty bushels to the acre.

Near the Mattole river ("Clear water," of the aborigines,) are numerous inflammable gas springs, which, on being ignited, form jets of flame several feet high that burn with brilliancy till extinguished by the wind or other accidental cause. One of these jets, discharging in the channel of the river, presents the singular appearance, when ignited, of a mass of flame issuing from a stream of water. Similar jets of less power occur on Bear and Mad rivers, and also in other localities in the neighborhood. Near these jets are found numerous springs of petroleum, some of them of considerable dimensions. The petroleum found here, (its most northern limit in the State) differs essentially in character and mode of occurrence from that found further south. Here the oil forms no asphaltum or other solid residuum. It either floats off in the water with which it is combined or evaporates entirely. The geological formation in which these jets and springs abound, or where the oil is found exuding from the ground, covers an area of nearly forty square miles.

In 1864 a number of companies were organized for the purpose of obtaining oil from these springs or boring for new deposits. A quantity of surface oil of excellent quality was collected, but no flowing wells or other deep deposits were obtained, though many wells were bored—the deepest to a depth of more than twelve hundred feet. After being diligently prosecuted for several years, operations were finally suspended in 1866, though there is little doubt but valuable deposits of this material exist in Humboldt county.

Beds of coal of good quality have been found on the headwaters of Mad river, and in the upper part of Mattole valley, but the lack of roads for transporting it to a shipping point, and the absence of a home market, have prevented any work being done to ascertain the extent of these deposits.

### TRINITY COUNTY.

This county, which derives its name from the principal stream flowing through it, is bounded by Klamath and Siskiyou on the north, by Shasta and Tehama on the east, by Mendocino on the south, and by Humboldt on the west. The principal industrial pursuit is gold mining, confined almost exclusively to the various branches of placer digging. The whole surface of the county is covered with chains of lofty mountains composed of granite and auriferous slates, the sides of which have been eroded into deep gulches and cañons. Though the county covers an area of 2,400 square miles—being eighty miles long and thirty miles wide—it contains scarcely more than ten or fifteen thousand acres of farming land, of which but three thousand five hundred acres were under cultivation in 1867. The arable land is mostly confined to the valley of the Trinity river and its branches. In this and several smaller valleys are many fertile and well tilled patches of land which produce most of the grain, fruits and vegetables, and dairy products required for home consumption. The Trinity and Salmon mountains, separating this county from Shasta, reach so great an elevation that some portions of them are covered with snow all summer. Parties attempting to cross them in the winter have often perished from the intense cold and the depth of the snow—the remains of some of these unfortunate travelers being found nearly every summer.

The first white man who entered the territory now constituting this county was P. B. Reading, then a hunter and trapper, who in the spring of 1845 left Sutter's Fort with thirty men to trap for otter and beaver in these mountains. Arriving upon a large stream it was named the

Trinity, under the supposition that it emptied into Trinidad bay, as laid down on the old Spanish charts.

On the discovery of gold, Reading, who had meantime remained in the country, again visited this mountainous region, taking with him a party of sixty Indians, through whose aid he obtained a large amount of gold on Trinity river—Readings bar, on that stream, being named after him. Since that period this gentleman has resided on an extensive farm owned by him in the upper Sacramento valley.

Trinity river, the only large stream in the county, rises in Scott's mountain, and receiving many small tributaries on its course, after running first southwest and then northwest, empties into the Klamath, of which it forms the largest branch.

The mountains throughout this county, which are covered for the most part with pine, spruce, maple, fir and oak timber, abound with game—some portions of them containing considerable quantities of grass and other herbage. There are fourteen small saw mills scattered over the county. They are all run by water, and cut an aggregate of about one and a quarter million feet of lumber annually—the whole for local use.

The population of Trinity county, numbering 5,125 in 1860, had been reduced to less than 4,000 at the close of 1867. A good wagon road has been constructed connecting Weaverville, the county seat, with the Sacramento valley on the east, and also, one running to Humboldt bay on the west. This town is situated in a pleasant valley near the confluence of Weaver creek and Garden gulch, on a flat known to be rich in gold. It is nearly three thousand feet above the sea level, and is surrounded with mountains, portions of which are covered with eternal snow. It derives its name, as does also the creek mentioned, from a miner named Weaver, who at an early period obtained a large quantity of gold from the latter. The town is handsomely laid out and well built up. Many of the dwellings have gardens, vineyards and fruit trees planted about them, indicating a high degree of comfort among the inhabitants. The population, which at one time numbered 1,800, is now much less. This place, since founded, has suffered severely from fires and floods, having been nearly destroyed four times by the former, and twice greatly damaged by the latter, and like many other mountain towns, is now gradually decaying as the diggings in the vicinity become exhausted.

Trinity was at one time a very prolific mining county, the annual yield of its placers having for several years in succession reached over $1,000,000. This class of mines is still yielding fairly, the average earnings of the mining population being, perhaps, equal to those of any other county in the State. There are also many auriferous quartz lodes in Trinity of great supposed value—few of them having been thoroughly prospected—while no attempt at working them on an extensive scale has as yet been made. The rugged nature of the country in which these lodes are situated, and the want of local roads have done much towards preventing heavy machinery being taken into this county, and consequently towards delaying the development of this class of mines. There are forty-five main ditches in the county, aggregating one hundred and fifty miles in length, constructed for the purpose of conducting water to points where used for washing. The cost of these works amounts in the aggregate to about $225,000, many of them having paid, as some still do, good interest on the investment.

### KLAMATH COUNTY.

Klamath county is bounded by Del Norte on the north, by Del Norte and Siskiyou on the east, by Trinity and Humboldt on the south, and by the Pacific ocean on the west. It is about forty-five miles long, east and west, and forty miles wide. Its topography is similar to that of Trinity county, already described—almost the entire area consisting of steep, lofty mountains, separated from each other by deep ravines, their sides eroded by innumerable gulches and cañons. Through these depressions flow streams of greater or less magnitude, accordingly as swollen by the melting of the snow in the spring and summer. There is but little agricultural or meadow land in this county, the rivers and creeks running through steep narrow gorges, preventing the formation of alluvial bottoms along them. There is scarcely any arable land along the Klamath river, though it runs, with its windings, a distance of more than sixty miles within the limits of the county. The total amount of land under cultivation does not exceed two or three thousand acres. Hoopa valley, about thirty miles long and two wide, situated at the junction of the Trinity and Klamath rivers, contains the largest body of good land in the county, but it is not much cultivated, being the site of an Indian reservation. Many portions of the mountains and the country towards the sea are well timbered with spruce, fir, pine, cedar and redwood, the latter being confined to a belt eight or ten miles wide near the coast, where some of these trees attain gigantic proportions. There are seven saw mills in the county, which made during the year 1867 over 2,000,000 feet of lumber, more than half of which was cut by the Trinidad mill, on Trinidad bay, whence the most of it was shipped abroad. The only grist mill in Klamath is on the Indian reservation, being the property of the United States government. A strip of country about five miles wide and twenty long, lying near the coast between Trinidad and Humboldt, comprises nearly all the level land in the county—the most of it, however, being heavily timbered, but little has been brought under tillage. To the east of the redwood timber belt lies a portion of the Bald hills, already described.

Placer mining constitutes the leading pursuit of the population of Klamath, though there are many lodes of gold bearing quartz in different parts of the county, some of which have been sufficiently prospected to demonstrate that they would pay well for working. In 1861 there were twelve quartz mills along the banks of Salmon river, there being numerous valuable quartz veins in this vicinity. The most of these mills having been destroyed by the flood of 1862, they have not since been rebuilt, leaving but three at present in the county. Klamath contains a number of small ditches, aggregating about one hundred miles in length, and costing $130,000. Gold Bluff, the discovery of which led to much speculation and excitement in the spring of 1851, and where the branch of mining known as beach washing has for many years been carried on, is situated in this county.

Klamath county is situated wholly to the west of the main Coast Range, which here makes a broad deflection to the east. The Salmon river mountains, dividing the Salmon from the Klamath river, are a broad broken range, running northwest and southeast, reaching an altitude, in some places, of perpetual snow. The principal rivers are the Klamath, Trinity, Salmon and Redwood. The county derives its name from the first mentioned stream, signifying in the Indian tongue "swiftness." This river heads in a series of large lakes situated on the confines of Oregon and California, and after pursuing a devious course through Siskiyou, Del Norte and Klamath counties, enters the ocean a little to the north of Gold Bluff. Once over the bar at its mouth, which, from its frequent shifting is difficult and dangerous of entrance, small steamers can run up forty miles, to its confluence with the Trinity, below which point it carries a volume of water equal to the Sacramento. Confined to a narrow, deep cañon, this stream frequently rises to a great height, it having, during the flood of 1862, reached a stage one hundred and twenty feet above its ordinary level, at which time it carried off a wire suspension bridge ninety-seven feet above low water mark, and also swept away most of the soil and improvements on its banks. The mountains bordering this river reach a considerable altitude—Prospect and Flagstaff peaks being upwards of six thousand feet high, while some unnamed ridges are still more lofty.

The Trinity, Salmon and Redwood all take their rise in the coast mountains, run northwest, and empty, the former two into the Klamath, and the latter into the Pacific ocean. Near the sources of the Salmon are the remains of an extinct volcano, an area of nearly two square miles being covered with lava, obsidian, and similar matter—their occurrence the more noticeable from being the only evidences of volcanic action in this portion of the Coast Range. The rocks here are almost exclusively slate and granite, and this, like Trinity county, is without hot or mineral springs and deposits of sulphur or petroleum.

Owing to its extremely rugged surface, but few wagon roads have been constructed in Klamath, most of the transportation being done with pack animals. During the winter, when the snow is deep, communication with the coast is kept up by snow-shoe express.

The placer mines here not having been worked so extensively as in the counties further east and south, pay better average wages, perhaps, than in any other part of the State. Many of the diggings, under the action of the floods, have also the further peculiarity of partially renewing themselves every year. Bars, worked out, are swept away, and new deposits formed, often affording virgin diggings. Water, in most localities, is also abundant, costing the miner but little. On the other hand, however, the country is difficult of access, the cost of living great, and operations much interrupted during the winter by reason of the cold and snow.

The first mining done in this county was in the spring of 1850, at Orleans bar, now the county seat. The present population of Klamath does not exceed fifteen hundred, a much smaller number than it contained ten years ago. The climate here is subject to heavy fogs and dews during the summer and to excessive rains—snow, on the mountains—during the winter. The precipitation along this part of the coast, as well as to the north, is much greater than at points further south, the quantity of rain and snow almost equalling that falling in the Sierra Nevada. The storms of thunder and lightning that sometimes occur among the higher peaks of the Coast Range are grand and appalling, being often kept up continuously for many hours.

The native tribes inhabiting this region, in common with those throughout the entire northern portion of the State, are large and well proportioned, but sullen, fierce and warlike, and being well armed, have given the settlers and miners much trouble ever since the first arrival of the latter in the country, These Indians are usually divided into three classes by the whites : the Coast, Klamath and Hoopa tribes—readily distinguished by their appearance and habits. The first occupy the southwestern portion of the county, along the sea coast, from Mad to Redwood river; this tribe is nearly exterminated, the remnant left having greatly degenerated through intercourse with the whites. The Klamaths live in the mountains that border the main river from its junction with the Trinity north into Oregon. In 1866 the various families composing this tribe numbered two thousand warriors; they are divided into the Mekares, or Upper, and the Weitchepecs, or Lower Klamaths. It was the former who, surprising Fremont's camp, in 1846, killed several of his party.

The Hoopas had their rancherias in the valley that bears their name, and on the mountains adjacent. A few hundred, mostly women and children, are all that is left of this tribe—which remnant has been collected and placed on the reservation in Hoopa valley.

These northern races, besides being larger and more athletic, are of a lighter complexion than those in the interior and southern portions of the State, the men being well developed, and many of the women by no means ill-looking, though the latter greatly disfigure themselves, at least in the estimation of the whites, by tatooing their chins in a hideous manner. The males are well skilled in the use of fire arms, and dexterous in all the arts and devices of the chase.

Gold Bluff, the discovery of which, in the spring of 1851, lead to one of those excitements culminating in sudden migratory movements, so common among the mining populations of California, is situated on the ocean beach, about fifteen miles south of the mouth of Klamath river, and twenty north of Trinidad bay. The bluff consists of a high sandy ridge or headland, against which the waves impinging, wear it slowly away. Mixed with the sand of which this bluff is composed are particles of fine gold, which, as the former is washed down by the action of the waves, are released, and mingling with the shore sand, forms the gold beach found at the foot of the bluff.

Orleans Bar, a small town of about one hundred and twenty-five inhabitants, is situated on the Klamath river, sixty-five miles southeast of Trinidad, and is worthy of notice only as being the county seat.

Trinidad, the only port in the county, contains about two hundred and fifty inhabitants. The town stands on a ridge, which, projecting south, shelters the harbor on the northwest. The port is an open roadstead, having deep water and good anchorage, but is exposed on the south and west. There are extensive wharves here, affording good accommodations for the increasing trade of the place.

Auriferous lodes of large size and supposed value have been found at several places in this county; and although the ores, so far as tested, have proved extremely rich, the lack of cheap transportation to a shipping point will probably prevent any extensive developments being made here for a long time.

### DEL NORTE COUNTY.

This county, organized in 1857, occupies the extreme northwestern corner of the State, having Oregon on the north, Siskiyou county on the east, Klamath county on the south, and the Pacific ocean on the west. It is about fifty miles long, east and west, and thirty miles wide. In its geographic and climatic features, Del Norte strongly resembles Trinity and Klamath counties, already described. The Klamath river, running across its southwestern border, and Smith's river, flowing centrally through it, are the only considerable streams within its limits. The entire southeastern part of the county is corrugated by a heavy chain of mountains, with numerous subordinate and parallel ranges, running northeast and southwest. There is also a similar tier of mountain ranges extending north and south, near the coast, the most westerly about six hundred feet high, and the main ridge, further back, three thousand feet high. The most of the county is well timbered with redwood, spruce and pine. It contains a number of small fertile valleys and a considerable extent of rich prairies, together with three thousand five hundred acres of swamp and overflowed lands. The number of acres enclosed in 1867 amounted to about 8,000, of which 3,500 were under cultivation, the most of it being planted to wheat, of which grain there were about 16,000 bushels raised, with 2,000 of barley and 9,000 of oats. The yield of the cereals here is generally large —wheat frequently turning out from thirty to forty bushels to the acre, and barley and oats much more. All the vegetables, dairy products and fruits required for the use of the inhabitants were also raised, the soil and climate being well suited to the growth of all these staples. Vines and berries also thrive with little care, and stock keep in good condition throughout the winter on what they can pick running at large. Several small flocks of sheep are grazed in the county—a few thousand pounds of wool being clipped every year. The horses and mules kept for draft number about 2,000, with about an equal number of neat cattle. There are no quartz mills in this county, though it contains many auriferous veins of much promise, and placer mining is carried on with success along the Klamath river and several of its tributaries, and also on the headwaters of Althouse creek. For introducing water into these diggings fourteen small ditches have been constructed at an aggregate expense of about $60,000. With additional water supplies the product of the placers might be much increased, there being yet a large scope of these mines but partially exhausted. The county contains one grist mill, situated in Smith river valley, capable of grinding fifty barrels of flour daily, and four saw mills of small capacity, situated in different localities, engaged in making lumber for local uses, there being none exported from the county. A good wagon road has been constructed, leading from Crescent City, the county seat, to Illinois valley, Oregon, a distance of forty-five miles. It cost $50,000, and serves for the conveyance of supplies to the Althouse and other diggings in southwestern Oregon.

A number of cupriferous lodes, some of them of good size and rich in metal, were discovered at a point about fifteen miles northeast of Crescent City, some ten or twelve years ago. Two or three of these were partially developed at the time, and several hundred tons of high grade ores taken out. Owing to their remoteness from market, however, and other unfavorable circumstances, but little has been done with these mines for the past ten years, though there is little doubt but they will ultimately prove valuable. It has recently been discovered that the croppings of some of these cupriferous lodes, consisting of mundic, are rich in free gold, forming deposits similar to those now being worked extensively and profitably in Placer, Amador and Calaveras counties.

The only town of any size in this county is Crescent City, containing a population of about five hundred, and, which being favorably situated on a small but safe harbor, the only one along this part of the coast, must ultimately become the shipping point for a large back country, insuring its future growth and importance. The entire population of the county amounts to about two thousand five hundred.

## SISKIYOU COUNTY.

This county occupies the northeastern corner of the State, being bounded on the north by Oregon, on the east by the State of Nevada, on the south by Lassen, Shasta and Trinity, and on the west by Klamath and Del Norte counties—its length, east and west, being one hundred and sixty, and its width, fifty-eight miles. It contains 5,300,000 acres, of which 250,000 are adapted to agriculture. In the year 1867 there were 50,000 acres of land enclosed, and 20,000 under cultivation. About 1,000,000 acres are covered with valuable forests, and nearly half as much more by several large lakes, of which Goose, Rhett and Wright are the principal. A large proportion of the county consists of rugged mountains, deep cañons and elevated, barren table lands. Mount

Shasta, situated in the southwestern part of the county, at the junction of the Sierra Nevada and Coast Ranges of mountains, reaches an altitude of fourteen thousand four hundred and forty feet.

The Klamath, Pitt and Scott's rivers are the only large streams flowing through the county. The former has its source in the Lower Klamath lake, situated partly in California and partly in Oregon, issuing from the southwestern side of which, near its middle, it flows in a westerly course until it enters Del Norte county. Scott river rises in the Scott range of mountains, runs northerly and joins the Klamath, near the western border of the county. Pitt river issues, a large stream, from the south end of Goose lake, runs southwesterly through Shasta county, until it unites with the Sacramento, forming the principal branch of that river. A large scope of country lying near the central and northern part of this county is without any surface drainage to the ocean, the water being collected in lakes, ponds and lagoons, whence it escapes by evaporation or subterranean channels.

The principal agricultural lands in the county are located in Scott, Shasta and Surprise valleys, the former two lying in its western, and the latter in its extreme northeastern part. There are many other valleys of small size containing a little good land, besides a limited quantity on some of the table lands found in the northern and eastern sections of the county—these latter also affording a considerable amount of pasturage. Scott's valley, forty miles long and seven miles wide, lying between the Trinity and Salmon mountains, which reach a height of six thousand feet, contains a large body of excellent land, nearly all of which is under cultivation. Grain, fruits and vegetables of nearly every description, are grown here without trouble, and generally yield well. The average yield of the wheat harvest of 1867 was twenty-five bushels per acre, some fields turning out as high as forty-five bushels to the acre. There are eight grist mills in the valley and its connecting branches, which, during the year 1867, manufactured seventy thousand barrels of flour. The product of these mills was greatly esteemed for its excellence, owing to the superior quality of the grain. Owing to the elevation of this county, nearly three thousand feet above the level of the sea, the harvests are late, the grain not being reaped until August or September. Frosts are frequent during the spring, and even in the summer months. The weather in the summer is warm, with cool nights; in the winter, often severe, especially on the mountains, where the snow falls to a great depth. Snow also lies to the depth of a foot or two, often for several weeks, in most of the valleys, rendering the use of snow shoes and sleighs a general necessity. The mountain, river and valley derive their name from a hunter and prospector named Scott, who first entered the latter in the spring of 1849.

Surprise valley, lying in the extreme northeastern corner of the county, and partly in the State of Nevada, is about sixty miles long and fifteen wide. It is one of the most beautiful and fertile of all the valleys lying in the high Sierra, being skirted on two sides with lofty, timbered mountains, and containing large tracts of fertile land, watered by numerous springs and streams, and covered with a luxuriant growth of wild clover and other grasses. On the east side of this valley are three beautiful lakes, extending in a chain nearly its whole length and covering more than one half of its surface. The upper or most northern of these lakes is sixteen miles long and five wide; the central one is twenty miles long by about three miles wide, and the southern and lowest fifteen miles long and three miles wide. Neither of these lakes have any outlet, though each receives the waters of a number of streams flowing from the mountains on the west. They contain no fish, though trout are found in the mountain streams running into them. At certain seasons of the year the whole valley swarms with ducks, geese, cranes, pelicans, and other wild fowl. All the land suitable for farming lies on the west side of these lakes, consisting of a strip of rich black loam, from two to six miles wide, gently sloping to their borders. Where not under cultivation, this land is matted with wild pea vines, grass and clover, so rank that it is often difficult to ride through it. This valley is said to have been known to Californians since 1852, but derives its name from the surprise its discovery caused a party from the State of Nevada, who came upon it while in pursuit of a band of maurading Indians, in the spring of 1861. It was supposed to be within the limits of that State until the establishment of the boundary a few years since showed it to lie mostly in California. This valley was first settled in 1866, when a small company entered it and located a number of land claims. Since then other settlers have gone there—the population now amounting to three or four hundred. At Fort Bidwell, situated on a handsome eminence at the north end of the valley, overlooking a large portion of it, a small garrison of soldiers is stationed, to protect the inhabitants against the Indians in the vicinity, who have always been troublesome. A grist mill and saw-mill have been erected in the valley, for the accommodation of the settlers. Several thousand acres of land have been enclosed, and part of it placed under cultivation—the cereals here yielding remarkably well. A market for the products of the farmer is found in the Owyhee and Humboldt mines—the former distant about two hundred miles, in an easterly, and the latter one hundred and thirty miles, in a southeasterly direction. The garrison at the fort, while it shall remain, will also take a portion of these products, and the Black Rock mines, lying fifty miles south, will create a further opening for them, should the lodes there prove valuable. There is also a good prospect that both quartz and placer mines will yet be found at no great distance to the north of this point, in Oregon.

Fort Bidwell, erected in 1865, occupies a commanding site at the north end of the valley. Willow creek, a large stream of pure water, flows by it, and situated a few rods above the post, is a large boiling spring, the waters of which, besides being useful for bathing purposes, could be advantageously employed for irrigation. The mountain ravines and slopes, lying two or three miles west of the main road leading through the valley, are timbered with pine, fir and cedar, affording fuel and all needed material for fencing and lumber. The climate here is similar to that of the other elevated valleys of California—the days warm, with cool nights, in the summer—the winters cold, with deep snow on the mountains, and but little in the valleys; the weather throughout the rest of the year being generally dry, and the temperature delightful.

Goose lake, thirty miles long and ten wide, is situated eight miles west of Surprise valley—a low range of mountains lying between them. The valley of this lake contains a large body of fine timber and between thirty and forty thousand acres of excellent farming and grazing lands, but it is without settlers; its remoteness, the hostile character of the surrounding Indians, and the absence of rich mineral deposits, having thus far deterred the whites from locating in it.

Pitt river, carrying a heavy body of water, debouches from the south end of Goose lake, and, pursuing a southerly course, flows for fifteen miles through a desolate plateau covered with large boulders and masses of blackened lava, known as the "Devil's Garden," at the end of which it rushes, roaring and foaming, through a deep defile, named, from its wild and rugged aspect, "the Devil's cañon." Emerging from this gorge, it meanders quietly through Spring valley, so called because of a deep pool of hot water situated on its banks, which, agitated by the chemical action going on in its subterranean chambers, throws up a volume of water as large as a hogshead to a height of ten feet, which falls back into a large circular basin with the noise of a mountain cascade. The country adjacent to Pitt river, and, with few exceptions, the immediate valley of the stream itself, is for the most part an arid, barren and timberless region. There is, however, some good land along the river, in the southern part of the county, where also the juniper and cedar attain a size making them serviceable for fuel.

Fall river, a large stream having its source in a group of immense springs at the eastern base of Mount Shasta, flows through a fissure-like channel, pursuing a singularly devious course for a distance of sixty miles, when it empties into Pitt river.

Mount Shasta, in its isolation the grandest peak, and for a long time supposed the loftiest mountain in the State, is situated in the south-westerly part of this county. It reaches an altitude of fourteen thousand four hundred and forty feet, its apparent height being somewhat diminished by the general elevation of the country and the many lofty peaks and ranges that surround it. For four or five thousand feet below its summit it is covered with snow at all seasons of the year—this being the only mountain in the State that remains snow-clad for any considerable distance below its summit throughout the entire year, Lassen's Peak, the Downieville Buttes, and all the other more lofty points in the State losing their snow late in the summer, except where it has drifted into deep ravines or lies under the shadow of cliffs on their northern slopes. The base of this mountain is covered, except on the north, to the height of between seven and eight thousand feet, with heavy forests of sugar and pitch pine. On its northern slope, owing to the poverty of the soil, the only trees found consist of a growth of stunted cedar and oak. Scattered through the higher parts of this heavy timber belt occur patches of chaparral, which, being indicative of a barren soil, are locally known as the "Devil's acres." Up to an altitude of seven thousand feet, the trees are of the usual dimensions; at eight thousand feet, forest trees disappear entirely, a few stunted and hardy shrubs struggling for existence up to the height of about nine thousand feet, between which and the line of perpetual snow, scarcely a moss or lichen is to be seen. Above the latter point, and reaching to an altitude of twelve thousand feet, the only sign of life met with is a low form of vegetable of a vermillion color, which, generated in and staining the snow, causes this belt to be known as the "red snow." Above the fields of this most primitive vegetation, the cone of the mountain lifts itself—a glittering pavilion of untarnished snow. The best season for ascending the mountain is in the month of July or August. Earlier than July the snow is not sufficiently gone—while, towards the end of the summer, the fires, common in the forests, fill the air with smoke, interfering with and often completely destroying the view. The ascent is made from the west side, and until a height of twelve thousand feet is reached is attended with no other difficulty than that always incident to the attenuated condition of the atmosphere at similar elevations. Above twelve thousand feet the ascent becomes more steep and laborious, the slope of the mountain inclining at an angle varying from thirty to forty-five degrees. Three days are required to make the journey with comfort and satisfaction. The first night is spent near the line of perpetual snow; the next day is consumed in going to the top of the mountain and returning to the spot left in the morning, where the second night is passed—the balance of the descent being made the following day. A good supply of blankets is required, as the temperature at this night-camp generally falls to the freezing point before morning. At an elevation of thirteen thousand two hundred and forty feet, a rudely circular, and nearly level space occurs, evidently the bottom of an ancient crater, one side of which having been broken away, a portion of its rim still remains, forming the summit of the mountain, which lifts itself one thousand two hundred and four feet above. On this level area are a number of orifices from which steam and sulphurous gases constantly escape—the feeble action of this solfatara being the only surviving manifestation of those stupendous forces that piled up the masses that form this extinct volcano. The thermometer, at midday, in summer, generally stands below the freezing point on the summit of the mountain. The air about its top is cold, even in the warmest weather, and is almost always in brisk circulation, the summit being frequently swept by strong gales that keep exposed portions of its sides denuded of snow. The outline of this mountain, from whatever side viewed, presents a nearly regular cone, the symmetry of which is somewhat marred, when observed from the southwest, by the interposition of the side cone, not two thousand feet lower than the main mountain, from which it stands wholly separated. No one has ever been on its top, it being steeper and more difficult of ascent than Shasta itself. The sky outline of the latter has a general inclination of about twenty-eight degrees on one side and of thirty-one degrees on the other, while the westerly slope of this side-cone inclines at about thirty-six degrees. While, as stated, certain exposed and rocky portions of the main mountain are denuded of snow, these bare spots disappear when viewed from a distance, the whole surface above the snow line seeming an unbroken sheet of white, distinctly separated from the dark belt of forest below. The entire mass of the mountain is of volcanic origin, the base consisting of trachitic lava and the more elevated portions of basaltic rock, there being but little scoria, ashes or other loose material to be seen, except near the summit, where there is a heavy bed of volcanic breccia. That this, however, as well as the adjacent cone, and many other peaks scattered over the country to the north, is wholly of volcanic origin, having been erupted from a crater-like orifice, admits of no doubt. The exact height of Mount Shasta, for a long time a somewhat mooted question, was a few years since definitely settled by the members of the State Geological Survey, in accordance with the figures above given.

Near Elk valley, which affords some of the finest views of Mount Shasta, anywhere to be had, there are said to be numerous caves which, though never fully explored, are supposed to extend for a great distance under the lava formation that here marks the geology of the country. Near Hurd's ranch there occurs also a very extensive cavern known as "Pluto's cave." It consists of a long gallery in some parts sixty feet high, and varying in width from twenty to fifty feet. The soil of Elk valley, composed mostly of volcanic sand, is barren and incapable of sustaining any vegetation, except a few worthless shrubs.

Shasta valley, like the Pitt valley, is a barren lava plain, containing, however, a few fertile spots. Rising from this plain, which has an altitude of over three thousand feet, are numerous conical hills of volcanic origin, that impart to the region a wild and rugged aspect.

There are many other mountains, valleys, caverns, and other natural objects and points of interest, in this extensive county, rendering it an attractive field to the scientific and curious.

Notwithstanding so large a portion of Siskiyou is covered with sterile valleys and arid plateaus, there is still much good farming and grazing land within its limits, as well as a wide scope of valuable placers. Numerous promising quartz lodes have also been found in the western part of the county, some of which have been extensively and profitably worked. Without going into more details, the magnitude of these several interests is sufficiently indicated by the following statements: The value of the real and personal property in the county was last year estimated at $2,000,000; 50,000 acres of land were enclosed, and 20,000 under cultivation. The number of acres planted to wheat were 3,500, producing 70,000 bushels; barley, 1,200 acres, producing 25,000 bushels; and of oats, 3,000 acres, producing 80,000 bushels.

There are at this time six quartz mills in the county, carrying forty stamps, erected at an aggregate cost of $60,000; eight grist mills, capable of grinding four hundred barrels of flour daily, and costing a total of $150,000; fifteen saw mills, with capacity to cut from two to four thousand feet of lumber, each, daily, built at an average expense of

$6,000. There are twenty-one ditches constructed for introducing water into the mines; these vary in length from three to eighty-five miles, and cost from one to three hundred thousand dollars each—the latter being the amount expended in the construction of the Shasta River Canal, built to carry the waters of that stream into the diggings about Yreka, and points further north, a distance of eighty-five miles. The present population of Siskiyou is estimated at six thousand, being somewhat less than it was eight or ten years ago.

## SHASTA COUNTY.

This county derives its name from Mount Shasta, formerly situated within its limits, but thrown into Siskiyou on the creation of the latter from a portion of Shasta, in 1852. Shasta is bounded on the north by Siskiyou, on the east by Lassen, on the south by Plumas and Tehama, and on the west by Trinity county. The county is watered by the Sacramento river and its numerous confluents, which, from a point near its southern border, radiate to its outer limits in every direction, rendering it one of the best watered counties in the State. Eroded by the action of so many large streams, the surface of the country is greatly diversified by mountains, hills and valleys—some of the ridges between these water courses, forming outlying spurs from the Sierra Nevada on the east and the Coast Range on the west, being rugged and lofty. The main Sierra, trending northwest to form its junction with the coast mountains, crosses the eastern portion of the county, imparting to it a truly Alpine character. Standing in this range, and stretching two-thirds of the distance across the county, are four high peaks, severally named, Lassen's, Crater, Magee's, and Burney's peak, separated from each other by spaces of ten or twelve miles. They are all of volcanic origin, as are many other peaks and buttes in the vicinity, and elsewhere in the county.

Lassen's Peak has four distinct summits, the highest of which has an altitude of ten thousand five hundred and seventy-seven feet, as determined by Messrs. Brewer and King, of the State Geological Survey, who ascended it in 1863, and ascertained its height by careful measurement. These summits, rising from two hundred and fifty to three hundred and fifty feet above the common level of the mountain, are only the remaining portions of what was once the rim of the great crater, formed when this was an active volcano. Near the top of this mountain occur, as in the case of Mount Shasta, evidences of long continued solfatara action, which here has ceased many years since. Viewed from the north or south, this peak presents the shape of a flatened dome, while, seen from the east or west, it has the appearance of a very steep cone. It is timbered for about two thirds of the distance to its summit, which is covered with snow on its northern slopes a good portion of the year. Some of the cones to the north, both those along the line of the Sierra and others scattered over the volcanic table lands in this part of the county, present, in their outlines, steep, pointed ridges, while, in other cases, they have circular craters on the top, all indicating for them a common origin. They vary in height from six thousand to nine thousand feet, there being at a point five miles north of Lassen's Peak a cluster of irregular truncated cones of less altitude, and evidently of more recent formation, and which, between 1854 and 1857, were constantly emitting large quantities of steam and gases. Numerous traces of well marked glacial action are found on Lassen's Peak, at an elevation of between six thousand and nine thousand feet. One of the best preserved craters in this region, so abounding with the remains of former volcanoes, is found near Butte creek, ten miles east of Fort Reading, where a cone, rising from the lava slope to a height of two thousand six hundred and thirty-three feet—eight hundred and fifty-six feet above its base—presents a well defined crater on its top, the rim about nine hundred yards in circumference and two hundred and twenty-five feet deep, nearly circular, remaining almost entirely perfect.

With so many rivers and mountain torrents, the surface of this county is cut by numerous valleys, some of them devoid of alluvial deposits, while others contain a considerable scope of bottom lands along the margin of the streams, or spread out into broad flats or mountain meadows. The climate in these valleys, though warm in the summer, is, throughout the balance of the year, mild and equable, snow and extreme cold weather being of rare occurrence even in the winter. That the temperature does not fall to a very low point, is shown by the fact that not only the hardier fruits of the north, but also the fig, pomegranate, cotton, almond, and other semi-tropical plants and fruits thrive here in the open air—Shasta being also one of the few counties in the State in which tobacco has been grown in notable quantities and of tolerable flavor.

The entire northern and western portions of the county are covered with forests of conifers of nearly every variety, except the redwood, which is never found so far from the coast; on the lower hills, scattered groves of live oak are common, with a species of ash along some of the streams. The eastern part of the county abounds in hot and boiling springs, several of which occur in the vicinity of Lassen's Peak, and are worthy of at least a passing notice. From one of the number, known as the "Steamboat Spring," issues quite a stream of boiling water, while from numerous vents, scattered over several acres in the vicinity, clouds of steam are constantly escaping. In one place a steam jet issuing in a pool of hot water, throws it up to a height of seven or eight feet with a loud noise. Formerly this action was much more violent than at present, the column of water being thrown to a height of over twenty feet. Two miles northwest of this spring, and nearly eight east of the summit of Lassen's Peak, is a pool of hot water six hundred feet long and three hundred wide, known as the "Boiling lake." From this pool, the water, always kept at boiling point, issues in a stream about two feet wide and several inches deep. It is of a milky color, and in places thickened almost to the consistency of cream. From this viscid material, especially about the banks of the pond, where it has accumulated, jets of steam puff up, forming a sort of mud pustule, or minature volcano, from a few inches to three or four feet in height. Clouds of steam and sulphurous gases escape from crevices in the surrounding lava, which is slowly wasting away under their action. About four miles northwest of the Boiling lake are still more copious hot springs, their chemical action on the adjacent rocks being also much more extensive. They occur for half a mile along a cañon, and discharge a large volume of water. The neighborhood abounds in sulphur; this mineral, sublimated in the numerous cavities, crystalizing on the surrounding rocks in the most delicate and beautiful manner. Salt and sulphur springs occur in various parts of the county, some of the latter being considered valuable for their medicinal properties.

An outcrop of coal of very fair quality has been found on Cow creek, whence it has been traced for eight or ten miles in a northwest direction. This bed is composed of several strata, one of which has been opened to a considerable depth, and found to consist of about one foot of coal associated with several feet of shale. This coal has been tried by the blacksmiths in the neighborhood, and pronounced well suited for the uses of the forge. A coal vein has also been extensively opened near Round mountain, and exhibits at the present time a very favorable appearance.

The population of this county is estimated at about six thousand, of whom one thousand two hundred are residents of the town of Shasta, the county seat. This is a lively place and has a considerable trade in the summer, being a supply point for a large scope of mining country to the north, east and west. It was at one time an active mining camp, but the exhaustion of the placers in the immediate vicinity has left it dull in this respect—it still, however, presents a comfortable and inviting aspect, being full of gardens, orchards and vineyards, and containing a number of well built private dwellings and public edifices. The settlement of some of the more remote agricultural valleys has been somewhat retarded by the hostility of the Indians, who have, in numerous instances, butchered whole families going into these localities to settle at an early day. Efforts are now being made for the establishment of an Indian reservation in this county, a measure that would probably benefit all parties, both the whites and the Indians. Scattered over about one thousand square miles of territory, comprised within the limits of Tehama, Shasta, Siskiyou and Lassen counties, are the following tribes of Indians: the Pitt river, Shasta, Hat creek, Pushus, Pah-Utahs, Antelopes, Nosers, Sacramentos, Tonatons and McClouds, embracing over two thousand souls in all, for whom no provision has hitherto been made by the Indian Department of the Government. The valleys and fisheries from which they formerly procured the most of their subsistence having been occupied entirely by the whites, renders it difficult for these people to longer sustain themselves upon the natural products of the earth, hence they are forced, in some cases, to depredate upon the whites, or suffer from the pangs of hunger. If they steal the property, or kill the stock of the settlers, the latter retaliate by shooting the Indians, who, in return, murder the whites whenever opportunity offers for them to do so with safety, and thus, a constant warfare is kept up to the great injury of both races. The plan of gathering these savages upon reservations, where, with good management, it is found they can be rendered self-sustaining, contributes not only to their comfort and safety, but also secures the whites against their further assaults and depredations.

With so many fertile valleys, and a climate so genial, the agricultural resources of Shasta, as will readily be supposed, are by no means inconsiderable. The number of acres of land enclosed, in this county, was estimated, in 1867, to be about 65,000, of which 35,000 were under cultivation; 10,000 acres, planted to wheat, yielded 150,000 bushels; 7,000 acres, planted to barley, yielded 190,000 bushels; and 2,000 acres, planted to oats, yielded 50,000 bushels. Besides these cereals, Indian corn, rye and buckwheat are grown to some extent, as well as broom-corn and tobacco, with nearly every variety of fruits, vegetables and berries—much stock is also kept in the county, and considerable quantities of butter and cheese made every year. In 1866 Shasta contained one thousand nine hundred and forty-two mules, ranking next to Yolo—the first county in this respect in the State. The number of sheep and hogs has multiplied rapidly during the past few years, rendering wool, pork and bacon important items in the products of the county. Besides several other small manufactories, Shasta counts a tannery and a pottery among her industrial establishments. There are two grist mills in the county, both driven by water; they have a daily capacity to make one hundred barrels of flour each—the cost of their joint construction being $22,000. Shasta contains twelve saw mills, capable of cutting from one thousand to six thousand feet of lumber, daily; all but two of these mills are propelled by water, the cost of each ranging from $2,000 to $12,000.

This county contained at one time a great extent of rich placer mines, and although the most of these are now pretty well worked out, there are still fair diggings in a number of localities, with a great many promising lodes of auriferous quartz. In the Pittsburg district, on McCloud's river, in the northern part of the county, a great number of veins were located in 1863, on the supposition that they contained valuable deposits of copper ore, much of this metal being found in the croppings. Subsequent explorations having shown the presence also of gold and silver, the latter predominating in value, a large population was drawn into the district, and much work done, some of these lodes having since turned out to be valuable. Veins of similar character have also been found on Cow creek and elsewhere in the county, indicating that vein mining, both for gold and silver, will yet become an active and profitable pursuit therein. Already there are twelve quartz mills running in the county, on rock yielding an average of over twenty dollars per ton by working process. There are also a good many arastras driven by horse power, and numbers of Mexicans make fair wages, crushing quartz with hand mortars, their earnings ranging from six to twenty dollars per day. Hydraulic washings are in successful operation at two or three points in the county, and, as water is abundant, this mode of working is likely soon to be greatly extended. One half of the quartz mills are driven by steam and the other half by water; they carry from four to eight stamps each, and cost, in the aggregate, about $100,000. Sixteen water ditches, besides distributing branches, have been built in the county. These works vary from two to fifty-three miles in length, and in cost from $5,000 to $140,000—the total sum expended in their construction being about $400,000.

## LASSEN COUNTY.

This county, erected in 1864 from the eastern parts of Plumas and Shasta counties, is named after Peter Lassen, an early explorer of the surrounding regions, and a pioneer settler in this part of California. It is bounded on the north by Siskiyou county, on the east by the State of Nevada, on the south by Sierra and Plumas, and on the west by Plumas and Shasta counties. For a long time, nearly the whole of this territory, together with the eastern part of Siskiyou county, was successively claimed, first by Utah, then by Nevada Territory, and finally by the State of Nevada, each of which, in turn, exercised jurisdiction over it until the year 1862, when the eastern boundary of California having been located to the east of it by a joint survey on the part of the two States, prevented a collision, already precipitated, from proceeding to extremities between the authorities of Plumas and Roop counties.

Lassen county embraces within its limits a large area, about equally divided between rugged mountains, alkali flats and arid sage plains, the only considerable body of good land in it being that lying along and adjacent to Susan river, generally denominated Honey lake valley, with a narrow strip in Long valley, further south. The mountains consist of the Sierra Nevada, which, trending northwest, strike across its southwestern border, forming a high barrier between this and Plumas county, and numerous straggling groups lying further north and east, the former well timbered with pine, spruce and fir, the latter containing no trees except a few scattered groves of scrubby pitch pine, called in the Spanish, "piñon", and a species of dwarf juniper. This piñon, a low, bushy tree, about one foot in diameter at the butt, and twenty-five feet high, being of a firm fibre, and full of resinous matter, makes a valuable fuel, though not worth much for other purposes. The juniper, or, as it is more commonly called, the cedar, being still smaller than the pine, and at the same time light and porous, is of little value, whether for fuel or lumber.

This county, as well as the eastern part of Siskiyou, all of Alpine, Mono and Inyo counties, lying upon or being wholly to the east of the Sierra Nevada mountains, and within the rim of the Great Utah Basin, partakes largely of the features that characterize that elevated and generally barren plateau, being marked by great aridity, vast stretches of alkali flats and sandy plains, clusters of desolate and broken hills, ranges of mountains alternating with narrow valleys, and a remarkable scarcity of animal and vegetable life. The only streams of any size consist of a branch of Pitt river, in the northern part of the county; of Pine creek, running into Eagle lake; and of Susan river, heading in the Sierra, and running easterly into Honey lake, together with a stream flowing through Long valley from the south, and emptying into the same receptacle. Besides these, there are a number of small creeks running down from the mountains into Honey lake valley, affording ample means for irrigating the rich lands lying along its western border, close under the Sierra, as well as furnishing an extensive water power, their descent being very rapid. The most of these creeks sink after flowing a short distance out upon the plain, though one or two make their way across it, emptying into Susan river.

There are two lakes in this county—Eagle lake, lying near its center, and Honey lake, in its southern part. The former, about twelve miles long and eight wide, is of very irregular outline, and no great depth; the latter is of almost equally irregular shape, and still more shallow, having, in fact, within the past few years, nearly dried up. It receives its name from the quantities of honey-dew found on the grass and shrubbery in the vicinity. This substance is deposited by the honey-dew aphis, a species of bee sometimes found in dry and barren countries. It is a sweetish, viscid liquid, resembling honey, and though never used by the whites, is gathered by the Indians, who, boiling the grass and twigs on which it is found, make a sort of molasses, of which they are fond.

Long valley, extending for more than forty miles through the southern part of the county, is a fine stock region, and, though but sparsely settled, there are usually several thousand head of cattle grazing in it—stock, as a general thing, doing well here, as is the case also in Honey lake valley throughout the winter, feeding upon the wild grasses, sage, grease-wood and other herbage found growing in the valley and upon the adjacent hills. At long intervals, however, snow falls in these valleys to the depth of twenty or thirty inches, causing much distress among the stock running at large—sometimes even destroying a portion of it. Usually the snow does not fall in the valleys to a depth of more than six or eight inches, and is of temporary duration; on the Sierra it always falls to a depth of many feet, and sometimes lies for several months on the interior ranges.

Honey lake valley, first settled in 1857, contains about twenty thousand acres of fine farming and meadow lands, nearly the whole of which is enclosed, and at least one fifth of it under cultivation. About one thousand acres of wheat, one thousand five hundred of barley, and two hundred of oats were sown in 1867, which yielded respectively at the rate of twenty-five, thirty and thirty-two bushels to the acre. Vegetables of various kinds and superior quality are raised here, and the hardier fruits are also found to grow and mature without difficulty, apples of large size and fine flavor having been grown for several years past. Irrigation, for which there are the best of facilities, is, however, found necessary for perfecting the crops, both of vegetables and grain. The considerable elevation of this entire region, everywhere over four thousand feet above sea-level, rendering the seasons short, a resort to this aid becomes necessary to hasten the growth of vegetation. Honey lake valley has an altitude of four thousand two hundred feet, and Summit lake, five thousand eight hundred feet, while many of the mountains within the limits of the county reach a height of more than seven thousand feet. They are generally dry and sterile, containing nothing but a scanty growth of bunch grass, and a few stunted pines and juniper trees. Like the rest of the country, they are nearly destitute of game, the only thing found to reward the labors of the hunter being hare, sage-hen, and an occasional deer.

Hot springs occur at several points in the county, the most noteworthy of which consists of a group situated on the margin of Honey lake. One of these springs boils furiously, the hot water leaping several feet high. It is about twelve feet square, and so deep that its bottom has never been reached by sounding. The other springs in this group are not so hot, some of them only tepid. They are all more or less impregnated with mineral substances—the waters of one being chalybeate, of another, saline, alkaline or sulphurous.

The population of Lassen amounts to about two thousand, six hundred of whom are residents of Susanville, the county seat. The value of the real and personal property in the county is estimated at $800,000. It contains seven saw mills, all but one driven by water, erected at an aggregate cost of $60,000, and having a daily capacity to cut from two thousand to fourteen thousand feet of lumber each; two grist mills, both run by water, cost $12,000, and together capable of making one hundred barrels of flour daily. The only water ditches in this county are such as have been built for purposes of irrigation; the largest of the number, the Willow creek ditch, is eight miles long, and cost $12,000.

The mineral wealth of the region embraced within and lying adjacent to Lassen county was, from an early day, supposed to be great, much prospecting for silver having been carried on there before the discovery of the Washoe mines. The extent to which this idea had obtained may be inferred from the fact that it was while on an expedition in search of silver mines supposed to exist to the northeast of Black Rock that the brave old pioneer, Peter Lassen, was killed by the Indians, in the spring of 1859. None of the explorations prosecuted in that quarter appear, however, to have resulted in any discoveries of value until the Black Rock mines, lying some fifty miles northeast of Honey lake, were found, about two years ago. Two quartz mills have since been erected at that place both of which have been running on the silver ores obtained from the mines with varying success. That the ores are rich, and very abundant, seems pretty well established, though they are doubtless of a very obstinate and intractable character. The district is but poorly supplied with wood and water, adding further to the difficulties in the way of a successful and economical treatment of the ores, which, should they really prove what is claimed for them, will have to be transported to points where there are better facilities for their reduction than exist at these mines, before they can be worked on an extensive scale. The Central Pacific Railroad, when built up the Humboldt, will run within less than a hundred miles of Black Rock, whereby much cheaper transportation of the ores being insured than is now practicable, there is a prospect that these mines will be largely and profitably worked in the course of a year or two more.

A good many claims were located, and considerable work done, on silver bearing lodes situated in the Sierra, west of Honey lake valley, as early as 1859, but as no extensive crushings have ever been made of the ores, nor enough work performed to prove the mines, their value remains undetermined—nothing having been done upon them since that early period. It is not known that any vein mines, or placers of importance, exist elsewhere in the county, though a good deal of prospecting for deposits of the precious metals has at different times been done.

## MOUNTAIN COUNTIES.

### PLUMAS COUNTY.

Plumas county, so designated from the Rio de las Plumas, the Spanish name of Feather river, which stream, and its affluents, ramify it in every direction, is bounded on the north by Shasta and Lassen counties, on the east by Lassen, on the south by Sierra and Yuba counties, and on the west by Butte and Tehama counties. Its greatest longitudinal axis extends southeast and northwest a distance of eighty-five miles, its transverse axis being about forty-five miles in length, giving to the county an area of about two thousand square miles. Being deeply furrowed by the Feather river and its numerous tributaries, nearly the whole of the central and southwestern part of the county is divided into narrow cañons separated by high ridges, the northeastern portions rising into the lofty Sierra which borders it in that direction. These cañons vary in depth from five hundred to three thousand feet—the gorge cut by the middle fork of Feather river, which, rising east of the main Sierra, has worn a passage through that range, being one of the deepest and wildest in the State. The Middle Yuba has also eroded for itself an exceedingly deep channel—that stream, at Nelson's Point, being nearly four thousand feet below the top of Pilot peak, an isolated mountain in the neighborhood. This peak, situated in the southern part of the county, and which reaches an altitude of over six thousand feet, is of volcanic origin, its northern slope being walled with columnar basalt, and its summit capped with a bed of lava six hundred and fifty feet thick. The view from its top is extensive and grand. Spanish peak, an isolated knob of similar origin, lies about twenty miles to the northwest, there being several other mountain peaks of lesser elevation in different parts of the county.

The surface of Plumas is covered everywhere with a heavy growth of coniferous forests, consisting of sugar and yellow pine, red spruce, the white or balsam fir, cedar, etc., there being scarcely a better timbered region along the slope of the Sierra. These forests are more open and scattered in the western part of the county, growing more dense as the mountain is ascended, even to its very summit. The county contains no lakes, or even considerable ponds of water, though hot and mineral springs are met with in several localities. The low altitude of Beckworth's pass, lying in the southeastern part of the county, has encouraged the citizens of Plumas to take preliminary steps towards forming a company for the construction of a railroad through it. This road is to be carried up the middle fork of Feather river, and thence over the Sierra, through this pass, a route on which but little snow will be encountered in the winter, though somewhat circuitous and leading through a broken and mountainous country.

Notwithstanding its great elevation and the extremely rugged surface of the country, Plumas county contains many fertile, well sheltered valleys and mountain meadows, admirably suited for agricultural and grazing purposes. The principal of these localities are American, Indian and Humbug valleys, Mountain Meadow and Big Meadow, Genesee, Long, Mohawk, Beckworth, Sierra, Red Clover and Round valleys, nearly all lying in the northern and eastern part of the county and on the upper tributaries of the Feather river. These valleys and meadows embrace in the aggregate nearly two hundred and fifty thousand acres of good land, and although the more tender fruits and vegetables are sometimes cut off by unseasonable frosts, good crops of the hardier kinds are generally secured, while the cereals yield with certainty and abundance. Most of the valleys are covered with a luxuriant growth of natural grasses, the adjacent mountains in some places also affording much pasturage. For hay, timothy grass is cultivated, few depending on the wild varieties for this article. In some instances irrigation is resorted to for securing a crop, though not generally. As a usual thing but little snow falls in these valleys, though it reaches a great depth every winter on the mountains. Cattle are the better for being housed and fed for a few weeks in the winter, though some seasons they scarcely require it. It is estimated that there are now over one hundred thousand acres of land under fence in this county, more than one half of which is planted to grain and vegetables. The principal cereals raised are wheat and oats, more than twenty thousand bushels of the former and one hundred thousand of the latter having been produced in 1867, a still larger yield being counted upon for the following year. The grain grown here is remarkably plump and heavy, the oats weighing forty and the wheat over sixty pounds to the bushel. Small quantities of rye, buckwheat, Indian corn and barley are also successfully cultivated—only enough of the latter, however, being sown for brewing purposes. A considerable amount of stock is kept in the county, over two thousand cows—enough butter and cheese being made for local consumption. Dairymen and stockgrowers in the lower counties are in the habit of driving their herds into the meadows that exist in the upper Sierra, and pasturing them there during the summer, returning them to the lower valleys when winter comes on. There are but few swine and no sheep, except such as are kept for the shambles, raised in the county.

Owing to the abrupt character of the country, Plumas has heretofore been but illy supplied with wagon roads. A project recently set on foot is now being vigorously prosecuted for constructing a first-class toll road from Oroville to Quincy, the county seat, with branches to Indian and to American valley. The entire length of this road will be one hundred and thirty miles, and it is to be built with the low gradient, for a mountain district, of four inches to the rod. Being confined mostly to the valley of Feather river, it lies below the deep snow line, securing it against serious impediment from the winter snows. The cost of this work is estimated at nearly three hundred thousand dollars, towards which the county contributes eighty thousand dollars. When completed, it is expected that this improvement will, by cheapening transportation and travel, rapidly increase the population of the county and greatly promote the development of its mineral wealth, which, as regards both the precious and useful metals, is undoubtedly great.

From an early day, placer mining, which is still extensively and profitably carried on, has been a lucrative pursuit in this county. For many years immense quantities of gold were taken out on the bars of Feather river and its tributaries, some of which continue to yield well, though the most of the dust now gathered comes from the hydraulic and tunnel claims, of which there are a large number being worked with good average, and, occasionally, with very large results. In its quartz veins Plumas has also a wide and prolific field of wealth, the average yield of these lodes, so far as tested, having been higher than in almost any other part of the State. The leading quartz districts, so far as active developments and the erection of mills are concerned, consist of Indian, Mohawk, and Genesee valleys—Greenville, Dixie, and Jamison creek. The Whitney lode, in Indian valley, is twenty feet wide, the vein matter, from wall to wall, composed of pay ore—not a pound being rejected—that yields by ordinary process fourteen dollars to the ton, besides a considerable percentage of rich sulphurets, saved for future treatment. The Crescent mine, in the same locality, worked since 1862, embraces a system of four ledges, which, by extensive explorations are shown to carry large quantities of ore—the results of five years' workings having ranged from fifteen to forty dollars per ton. The average yield for the year ending with June, 1867, was sixteen dollars per ton, the net earnings of the mine having been fifty thousand dollars during that year. The dividends to stockholders since the opening of the mine have been over one hundred thousand dollars, besides earnings applied to defray current expenses and the erection of two first-class mills, carrying an aggregate of fifty-six stamps. The lode of the Indian Valley Mining Company, like that last mentioned, has been worked steadily and profitably for a series of years ; and although other and even more notable examples of success might be cited, the foregoing will serve to illustrate the general character of the veins and grades of ore found in this county, which offers inducements second to no other in the State for the investment of capital in this branch of mining. There are now twenty-six quartz mills in this county, carrying a total of three hundred stamps, and erected at an aggregate expense of $400,000, the individual cost ranging from $3,000 to $100,000, according to location and capacity, the earliest built being more expensive, owing to higher prices of labor and material, than those of recent date. There are one hundred and forty miles of water ditches in the county, constructed at a cost of not less than $350,000, the Spanish Creek ditch, alone, having cost $150,000. There are twenty saw mills and two grist mills, the most of them of moderate capacity.

Besides its placers and veins of gold bearing quartz, Plumas contains many lodes rich in cupriferous ores, several of which had been extensively opened and were being worked with fair prospects of success, when the extreme depreciation of copper ores checked further proceedings, though there is no doubt but with an improved market for this metal these lodes will be again worked more largely than ever before, and with remunerative results, as the ores are abundant, easily obtained, and many of them of an unusually high grade. Marble of fine quality, being beautifully variegated, and susceptible of high polish, abounds on the middle fork of Feather river, and a vein of coal has been found in Indian valley, the croppings of which have proved to be of a quality sufficiently good at least for domestic uses and the blacksmith's forge. The population of this county, estimated in 1866 at three thousand six hundred and seventy, on the basis that the school children under fifteen years of age constitute thirty per cent. of the inhabitants, is now believed to be at least four thousand.

## SIERRA COUNTY.

This county, which derives its name from the Sierra Nevada mountains that cross its eastern border, is bounded as follows: Plumas county on the north, the State of Nevada on the east, the county of Nevada on the south, and the counties of Yuba and Plumas on the west. The description already given of Plumas county will, in nearly all that relates to soil, climate, topography, timber, and other natural productions, apply equally well to Sierra. There are, however, in the latter, a number of small lakes, with a scattering of scrubby oaks on the lower foothills, while the mountains here are scarcely so high, or the cañons so deep, as in Plumas.

The principal streams flowing through Sierra consist of the north and middle forks of the Yuba, the former running centrally through, and the latter forming the southern boundary of the county. In length, Sierra extends about fifty miles, east and west, by twenty miles, north and south—its area being not quite half that of Plumas—it also containing much less agricultural land than the latter. Situated on top of the Sierra Nevada mountains, where this range spreads out into broad flats and basin-like depressions, are a number of ponds and small lakes, in one of which, called Gold lake, about four miles long and two miles wide, the middle fork of Feather river has its main source, another branch of this stream heading in a smaller lake located in Sierra valley, eighteen miles further east. The most of these lakes are of circular form, and from half a mile to a mile long, many being much smaller —not more than eight or ten rods over. Some of them are very deep, a hundred foot line having failed to reach the bottom of Gold lake. This locality is worthy of notice as being the spots visited by the first of those expeditions fitted out in California to search for supposed rich, but, as experience has shown, imaginary deposits of gold. This adventure dates back as early as the summer of 1849, though generally represented as occurring one year later. A similar movement did, indeed, transpire in 1850, based, no doubt, upon the rumors that gave rise to the original expedition, which, in reality, took place at the time above stated.

There are several isolated peaks and buttes in this county, the most conspicuous of which are Table mountain, over six thousand five hundred feet high, and Saddle mountain, lying a few miles south of it, and not quite so high, and the Sierra Buttes, thirteen miles east of Downieville, the latter eight thousand three hundred feet high. Like Plumas, the whole of this county has a considerable altitude, scarcely any of it being less than three thousand feet above the level of the sea. The bed of the North Yuba, where crossed by the west line of the county, and about the lowest point in it, is two thousand one hundred and sixty-six feet high, while many of the mining camps in the county have an altitude of more than five thousand feet. Nearly the whole county is underlaid by auriferous slates, generally covered by volcanic accumulations, the former being denuded by the numerous deep ravines that furrow the country in every direction. Along the crest of the Sierra this slate is capped by high volcanic "buttes," imparting to the range a sharply serrated contour. The most of the lava found in this region is basaltic, though there are in places large quantities of breccia and conglomerate. The slates, with occasional serpentine, are to be seen only in the valleys and cañons where the superimposed volcanic mass has been worn away by the action of the water.

While considerable quantities of fruit and vegetables are raised, there is but little stock kept, and only a limited amount of grain grown in this county, the arable and grazing land being mostly confined to a few small valleys and mountain flats, the latter too elevated to admit of the successful culture of the more tender plants and fruits, though most kinds of grain and vegetables are raised without trouble. The land enclosed amounts to twenty-five thousand acres—one third, perhaps, under cultivation—barley, of which about twenty-five thousand bushels are raised annually, being the principal cereal planted. Large quantities of potatoes, and other esculent roots of superior quality are grown, while the peach, vine and apricot flourish in many of the deep and warmer valleys.

The climate here is rigorous in the winter, the cold being severe and the snow falling to a great depth and lying for several months on the higher ridges and mountains, though generally there is but little in the lower valleys. As is the case in all the inhabited mountain districts in this part of the State, the principal mode of traveling at this season is on snow-shoes—what is known as the "Norwegian skate," being employed for the purpose. This skate, or shoe, consists of a strip of pine board four inches wide and from eight to twelve feet long, slightly turned up forward, which being attached to the feet, the traveler, furnished with a pole to steady and guide him, makes his way over the snow, when soft, with a speed and facility to the novice quite surprising. The velocity with which a person experienced in the use of these shoes will descend a mountain side deeply covered with snow is, to one never having witnessed the performance, incredible. Nearly all classes residing in the more Alpine regions of the State practice with these skates, without which travel would be nearly impracticable, since it becomes almost impossible to break roads where the aggregate snowfall amounts to forty or fifty feet in a single winter—it lying often at one time to depths varying from ten to fifteen feet. Snow-shoe racing constitutes a popular and exhilerating sport among the inhabitants of these elevated districts, even the women frequently becoming competitors in these trials of speed and skill.

Downieville, the county seat of Sierra, contains one thousand five hundred inhabitants—the population of the entire county being seven thousand. Howland Flat, a populous mining neighborhood in the northwestern part of the county, numbers one thousand inhabitants, and Sierra valley, a broad flat situated high up in the mountains, about as many more, a large proportion of whom are women and children—the inhabitants of this locality being engaged chiefly in stock raising and farming. With the exception of a group of thermals strongly impregnated with sulphur, located one and a half miles east of Sierraville, there are no hot or mineral springs in this county.

In the matter of mineral resources, Sierra may, for its size, justly claim to be the leading county in California, both as regards placer and vein mining. The diggings here, from the first extensive and prolific, still continue among the most profitable and largely productive in the State; several of the quartz claims, such as the Sierra Buttes, Independence, Keystone, Primrose, Gold Bluff, and Gold Valley mines, having been steadily worked for many years, with highly remunerative results. Ranking among the best of these properties is the lode of the Brush Creek Quartz Mining Company, located three miles west of Forest City, and which, though partially explored as early as 1857, was not thoroughly opened and rendered largely productive until a recent date. Across this county, pursuing a generally north and south direction, run several strongly marked branches of the far-famed ancient river channels, which, though scarcely more than scratched, have already yielded millions of dollars, and which, in their rich and wide-spread deposits insure profitable mining for centuries to come. On the most eastern of these channels, which has as yet been but little opened, are situated the very prosperous mining camps of Nebraska and American City; on that lying next west, somewhat more extensively worked, are Forest City, Alleghany, Wet Ravine, Chips' Flap, Centerville, and Minnesota; while on the three remaining channels, taking them in their order as we proceed west, we have first, Deadwood, Sebastopol, Excelsior, Monte Cristo, Rock Creek, and City of Six, the deposits up to this point being reached and operated by means of shafts and tunnels, while those further west are mostly worked by hydraulic washing. On the next channel are located Table Mountain, Poker Flat, Washoe, Morristown and Eureka; on the next, beginning as before, on the north, are Whisky Diggings, Howland Flat, St. Louis and Port Wine; the points on the most westerly channel, where heavy work has been done, being Hepsydam, Gibsonville, Laporte and Poverty Hill, the old river beds below the points mentioned being less explored, though probably equally rich with those already opened and for so many years worked with success. Hydraulic, as well as tunnel mining, is prosecuted in this county on a very extensive scale, many of these claims being among the largest and best paying in the State. The celebrated "Blue Lead," in so far as it may be a different gold bearing channel from that of these ancient rivers, finds its most marked development in this county, having been a source of immense wealth ever since it was first laid open.

Many silver and copper bearing lodes have been found in the central and eastern parts of the county, but none of them having yet been proved by deep exploration, it would be premature to pronounce upon their value, though both class of ores have yielded satisfactory and often very large returns, both by assay and working tests.

Sierra contains about forty quartz mills and thirty saw mills, many of the former being large and costly establishments, the earnings of which have been steady and liberal. The extent of water ditching in this county is very considerable, the length of this work being one hundred and forty miles, constructed at an aggregate cost of about $400,000.

## NEVADA COUNTY.

This county, which derives its name from the Sierra Nevada mountains that run across its eastern extremity, was erected from a part of Yuba county in 1851. It is bounded on the north by Yuba and Sierra counties, on the east by the State of Nevada, on the south by Placer, and on the west by Yuba county. In form it is long and narrow, extending sixty-five miles east and west, and fifteen north and south, giving it a superficial area of about one thousand one hundred square miles. With the exception of the eastern portion, covered by the great snowy range, the surface of the country is much less rugged and broken than that of Sierra and Plumas lying to the north; the western section, occupied by the lower foot-hills, and finally sinking into the broad plains of the Sacramento, being comparatively level. The middle fork of the Yuba river forms about two thirds of its northern boundary, separating it from Sierra county, the south fork of that stream running centrally through it. Without partaking of the striking features that mark the country, further north the scenery in the upper part of the country is varied and often wild and majestic; while the central and lower portions are pleasantly diversified by deep ravines, knolls and dales—rolling prairies, wooded mountains and long sweeps of gently sloping hills. Here the country is covered with a mixed growth of oak and pine; the trees, which generally attain but a moderate size, being gathered in clumps or scattered sparsely over it. Interspersed through the timber, or growing in the forest glades, are many varieties of beautiful flowering shrubs, the most picturesque and fragrant of these being the buckeye, the chamiza, the wild lilac and the manzanita, that everywhere adorn the landscape and fill the air with perfume during the spring and early summer. The open spaces among the foot-hills, and more especially the prairies that skirt them, bloom in spring time with fields of wild flowers of every form and hue—all exceedingly brilliant and graceful, though generally deficient in odor. Sometimes a single variety will occupy several acres, to be followed by another patch equally extensive, covered by a different kind. It would be vain to seek in the most carefully cultivated gardens, where the choicest floral treasures of the world have been gathered, for anything more exquisitely shaped or tinted than can be found growing wild and uncared for in these immense parterres. The soil on the uplands is a ferruginous loam, deep, warm and generous; that of the bottoms and basin-like flats, a dark vegetable alluvium, having great strength and body, and being exceedingly well adapted for the culture of fruits, grains, and vegetables; while the vine thrives better on the red, hill soil, growing luxuriantly and yielding with an abundance, to the very tops of the mountains. Certain of the fruits, such as the peach, quince and apricot also prefer the lighter and drier soil of the uplands, which, from the decomposition of slates and volcanic material intermixed with iron and vegetable mould, is by no means lacking in the elements of fruitfulness and strength. Wild grasses of several varieties grow sparsely nearly everywhere throughout this lower country, affording a good deal of nutritious pasturage. The summer climate here is hot during the day, though the nights are generally cool. The spring and autumn seasons, exempt from extremes, are always delightful, which is also the case in the greater portion of the winter, but little snow ever falling and the cold never being excessive; stock, except work cattle, are rarely ever housed, nor do they require much fodder unless the winter is uncommonly severe. Indeed, a more pleasant rural region, or a more desirable abode for man than is furnished by these foot-hills, is nowhere to be found. And, since what has been said concerning the portion of them lying in Nevada, will apply equally well to the entire range stretching south more than two hundred miles through the remaining mining counties, no further description thereof will be required when we come to speak of the latter.

That the climate of this county, though mild in the lower regions, is, in different parts widely unlike, especially in the winter, may be inferred from the fact that some sections of it are more than eight thousand feet high, while others are elevated but a few feet above the level of the sea. In the latter, snow, as has been stated, never falls to any great depth and soon disappears; while on the mountains it accumulates to depths varying from ten to thirty feet, according to altitude and exposure, some of the higher peaks retaining it on their northern slopes nearly all the year around.

There are several small lakes in the upper part of the county, of which Donner, situated east of the main crest of the Sierra, is the largest and most attractive; its great beauty, and the wild scenery around it, promising to render it one of the most popular resorts in the Sierra.

While mining is the chief industry and source of wealth in this county, many of the inhabitants depend, at least in part, upon the products of the soil for a subsistance; considerable quantities of grain being raised, and much attention paid to horticulture, viniculture and fruit growing. Fruits and vegetables of excellent quality are raised in nearly all parts of the county, while the number of vines in 1867 exceeded three hundred thousand. About seventy thousand acres of land were enclosed that year, of which nearly one half were under cultivation, producing wheat, barley and oats in nearly equal proportions. The number of draft animals kept is large, many being required for hauling ore from the mines to the mills and supplying the latter with fuel. There is also a heavy business done here in lumbering, calling for the services of many teams in hauling logs and transporting the product of the mills to market. About two thousand cows are kept in the county, there being many small dairies for supplying the local demand for butter, milk and cheese. Only a sufficiency of sheep and swine are raised for the shambles, the annual product of wool amounting to but a few thousand pounds. Besides twenty saw mills, many of them costly and of large capacity, there is an extensive grist mill, three tanneries, two foundries, and several other small manufacturing establishments in the county.

The principal towns in this county are Nevada City, the county seat, and Grass Valley lying four miles further southwest. The former has a population of about three thousand five hundred, and the latter of six thousand. They are both mining centers of note, Grass Valley being famed for the large number of rich quartz veins in the vicinity, and the success with which many of them have long been worked. Though often desolated by fires, and suffering severely from those sudden migrations which have so frequently diminished the populations of our interior towns and mining camps, they have continued to steadily advance and maintain their position as prosperous and growing places; the superior character of the mines in the neighborhood generally causing, sooner or later, a return of nearly all, who, under the impulse of temporary excitements had hastened away to other and often distant localities. And such is now the well ascertained extent and value of the mines adjacent to those towns that their future growth and permanence seem well assured. They each contain numerous well constructed halls, churches, school houses, and other public edifices; are supplied with gas and water works, have an efficient fire department, and a well organized local government, with various social, literary and charitable institutions reflecting credit on the benevolence, enterprise and enlightenment of the inhabitants.

Besides these two leading places, there are many other thrifty and growing towns in the county, the more prominent of which are the following : San Juan, situated ten miles north of Nevada, is the principal village in a series of mining camps and hamlets scattered at intervals of two or three miles along the ridge that slopes north to the middle Yuba. The name was first given to a hill at this point in which rich diggings were developed as early as 1853. The surface placers in the vicinity have been very prolific, and some of the most remunerative tunnel and hydraulic claims in the county are still being worked in the neighborhood. The town now contains about one thousand inhabitants, and is not only a prosperous and active, but also a cheerful and handsome place, much care having been bestowed by the inhabitants upon the culture of vines, fruit trees and flowers, every residence, almost, being adorned with many varieties of the latter, and the environs of the town being planted with vineyards, gardens and orchards. The facilities afforded for irrigation by the numerous water ditches have done much to promote improvements of this kind—the inhabitants having early availed themselves of this aid for planting and adorning their grounds. North San Juan, as this village is generally termed, to distinguish it from places bearing the same name elsewhere in the State, has a good local government and thoroughly organized fire department, who operate with hose attached to the hydrants of the water works belonging to the town. There are a number of schools and churches, and several benevolent orders in San Juan, which is also the headquarters of some half dozen stage lines, radiating to surrounding localities, and the center of a large local trade. Mining, throughout this district, is prosecuted on a scale of great magnitude. The annual yield of gold of Bridgeport township, in which San Juan is situated, for the past ten years has exceeded $1,300,000. Sebastopol, a hamlet one mile east of San Juan, is composed of the residences of those owning the American and Gold Bluff mines, on Junction Bluff and Manzanita Hills ; Sweetland, a short distance south, being another village, containing, with its environs, a population of two or three hundred. Birchville, four miles east of San Juan, is another pleasant little town embowered amidst trees and beautiful with vines and flowers. The inhabitants are principally engaged in mining—large quantities of gold having, for many years, been gathered in the district, through a system of bed-rock tunnelling. Five companies, operating here, took out, in the year 1866, an aggregate of $581,000, of which $327,500 were net proceeds. Not one half the rich ground here has yet been exhausted. French Corral, with a population of about four hundred, is another flourishing mining town lying a few miles below San Juan, on the Middle Yuba. Tunnel and hydraulic mining has been carried on extensively and profitably here for more than twelve years, there being, besides the hill diggings worked by hydraulics, a broad stratum of blue cement underlying the gravel, and found to be very rich in gold. Cherokee, though a much larger place than French Corral, is surrounded by a similar character of mines. The auriferous flat near the town, worked out in the early day, proved extremely rich.

Rough and Ready, Little York, You Bet, Red Dog, and Eureka, rank among the active and progressive mining towns of this county, the former having been among the very earliest settled places in it. In the spring of 1851 Rough and Ready was a village more than twice the size of Grass Valley, the surface claims near by, covering a broad scope, having paid largely. There is still a good deal of mining being prosecuted in the vicinity; and the town, though not keeping pace with some of its neighbors, contains in its orchards, vineyards, and cultivated gardens, many evidences of thrift and comfort. Little York, lying on the ridge between Steep Hollow and Bear river, being almost hidden from sight by fruit and shade trees, presents a very attractive appearance. The early diggings here were good, and the large bodies of cement on which several mills are now running, with the high banks of auriferous earth, give assurance that mining will be largely and profitably carried on here for many years to come. For a California mountain town, Little York has been singularly fortunate in an entire exemption from fire—no sweeping conflagration ever having occurred to lay it in ruins. Red Dog, lying a little to the north, has, on the contrary, been a severe sufferer in this respect, having been several times completely devastated by fire. The place and vicinity contains about three hundred inhabitants. There are four mills within a short distance of the town, crushing the blue cement that is here found in a heavy body—there being several others, at no great distance off, also running on this material. The town of You Bet, lying midway between Little York and Red Dog, contains a population, during the active mining season, of about one thousand, and is sustained principally by hydraulic and cement mining—being situated on the "Blue Lead" channel. Five cement mills are worked steadily and successfully in the vicinity of the town. Eureka, which is situated on the divide between the South and Middle Yuba, being surrounded by shallow placers, was a favorite mining ground in the earlier day, the diggings being easily worked, but soon exhausted. Lately the district has attracted much attention by its many promising veins of quartz, for working which five or six mills have been put up within the past year. The most of these mills are running steadily, and are understood to be meeting with a fair degree of success. Much work is being expended in the development of the mines, and the prospect is that Eureka will in a short time become one of the most active camps in the eastern part of the county. In the Meadow Lake district, lying upon the summit of the Sierra, in the eastern part of the county, a great number of gold bearing lodes were discovered in 1864, and much excitement ensuing, a population of more than one thousand was drawn into the district soon after. Five quartz mills have since been erected, but much difficulty having been experienced in treating the ores, owing to a want of suitable processes for saving the gold, the most of these mills have remained idle since their erection. When this want shall be supplied, this will, no doubt, become a very prosperous district, as the ledges, which are large and numerous, are known to carry a large percentage of gold, while the facilities for reduction, owing to an abundance of wood and water, are of the very first order.

The present population of Nevada county numbers about eighteen thousand, the assessed value of the real and personal property therein being nearly $6,000,000, exclusive of mines. As stated, the business of mining for gold constitutes the leading pursuit in Nevada, the mines here consisting of both placer and quartz, the former conducted mostly by deep tunneling and hydraulic washing. Vein mining was entered upon in this county at a very early day; about the first persistent trials made in the State having been at Grass Valley, where this branch of the business was initiated as early as the spring of 1851; and where it has since been prosecuted with better average results extending through a series of years than at any other point perhaps in the world. At first mistakes were made, and difficulties encountered here as well as elsewhere; but, through persevering efforts and good management, these have been so far overcome that latterly a high degree of success has rewarded the labors of many companies operating in that neighborhood. Glancing at a few prominent facts connected with the history of these, a more detailed notice of the whole will be found in our chapter on "Mines and Mining." Viewed as a whole, the lodes in this district are not distinguished so much for their heavy body of vein matter as the high grade and tractable character of the ores they carry; hence the facility with which the latter have been managed and the very liberal and often extremely large returns that have attended their working.

The yield of bullion from the Eureka mine, for the year ending September 30, 1866, amounted to $521,431.41; mining and milling expenses, and cost of construction for same period being $192,648.44, leaving a profit divided among the owners of $328,782.97—nearly all extracted by a twenty-stamp mill belonging to the company. The whole amount of ore crushed was 11,375¾ tons, the average yield being $45.83 per ton. The total product of bullion from this mine for the year ending September 30, 1867, was $585,316.10, net profits $348,102.37, the average yield of the ore, including sulphurets, having been within a fraction of $48 per ton. The North Star mine for the six months, ending January 1st, 1868, turned out $110,545.84, of which $20,000 were divided as net profits, and $30,000 expended on improvements, the balance having been absorbed by current expenses of working the mill and mine. These results were not so favorable as had previously been obtained, the company claiming to have cleared from this mine during the five years ending with June, 1867, the sum of $375,000. From the Empire mine there were raised during the fourteen years, ending June 30th, 1867, a total of 37,840 tons of ore, which yielded an average of $35.20 per ton. During the following six months 3,500 tons of ore were extracted from this mine, turning out a total of $100,000—$27,000 of which were disbursed to the owners as net gains. Among many other productive and promising mines in the vicinity of Nevada, the Banner, situated about two and a half miles southeast of the town, stands conspicuous, having for several years past been worked with energy and success. The company own a twenty-stamp mill, which is kept in steady operation on the ores raised from the mine—2,768 tons of which, reduced during the four months ending with January 1st, 1868, yielded $65,512.72, the average yield having been at the rate of $23.74 per ton. There were raised from the mine, between January 1st, 1865 and January 1st, 1868, 10,222 tons of ore, which gave a bullion product of $207,949.66, making an average yield of $20.34 to the ton, of all the ore taken from the mine since it was first opened. A shaft has been sunk on the ledge to a depth of four hundred and twenty feet, at which point it varies from one to four feet in thickness, the average thickness being about three feet. Within the past fourteen years the total production of the placer and quartz mines in Grass Valley district has amounted to about $24,000,000—the most prolific vein in the neighborhood, that running through Massachusetts and Gold hills, having yielded over $5,000,000. While the most extensive worked and best paying quartz mines in the county are those in the vicinity of Grass Valley, there are a great number in other localities from which excellent returns are being obtained.

There are at the present time sixty-five quartz and twenty-one cement mills in this county—the entire number carrying six hundred and eighty-five stamps, and costing in the aggregate $1,350,000. Some of these mills are large and perfect in all their appointments, no expense requisite to their efficiency having been spared.

Besides the precious metals, many copper bearing veins have been found in different parts of this county, the largest number being located in Rough and Ready township, where a great deal of labor was applied towards opening these lodes in the spring of 1863. The ores, however, generally proving of too low a grade to warrant thorough development, all work was within the following two years suspended, to be resumed, most likely, when labor shall be cheaper, and the prices of copper ore advanced beyond present figures. These ores ranged from five to twelve per cent. of metal, and one lot sent to Swansea netted a profit of thirty-five dollars per ton to the shippers.

There are over fifty water ditches in this county, many of which having been consolidated since their construction with other works of the kind, have lost their original names. These improvements have an aggregate linear extent of eight hundred and fifty miles, and cost about $4,250,000. The first of these enterprises was projected as early as 1850, the more recent having been consummated only within the past few years. Some of these works, not less on account of their cost and the grand scale on which they have been designed, than of the vast utilitarian ends accomplished through their completion, deserve to be ranked among the great public improvements of the day.

At the present time, the two leading works of this kind in the county are the Eureka Lake and Yuba Canal Consolidated, and the ditch of the South Yuba Canal company, both among the most costly, extensive and profitable works of the kind in the State. The last named of these ditches, taking water from the South Yuba, and from several lakes, as feeders, carries it to the mining camps about Dutch Flat and Gold Run, in Placer county, and down the ridge between the South Yuba and Bear river, as far as Grass Valley, supplying on its route, the intermediate country. The ditches of this company are remarkable for the permanent manner in which they have been constructed, and for the fact that the property still belongs to its original planners and builders—the most of these works having, through the inability of the first projectors to carry them on, passed, at an early stage in their progress, into the hands of other parties. The main trunk of this company's system of ditches, though but sixteen miles long, cost, with its tunnels and flumes, not far from $600,000. One of these tunnels, sixty feet in length, cost $6,000; another, three thousand eight hundred feet long, having cost $112,000, The flume, seven miles long, runs for one and a half miles through a gallery worked into the side of a precipice of solid rock one hundred feet high—the cliff being so impending that the workmen had to be let down from the top to commence drilling and blasting, an expedient not at all uncommon in the construction of these works in other parts of the State. This main trunk is six feet wide and five feet deep, having capacity to carry eight thousand five hundred inches of water, miner's measurement. From this head ditch branches ramify, carrying water over an immense tract of country, supplying a vast number of mills, hydraulic and sluice claims. This company have thrown dams across the outlets of four lakes situated near the summit of the Sierra, using them as reserves for supplying their canals in the dry season. One of these dams, constructed of solid masonry, forty-two feet high and one thousand one hundred and fifty feet long, at the outlet of Meadow Lake, has increased its volume of water more than ten fold—this lake, formerly a mere pond, now being, when full, more than a mile and a quarter long by half a mile wide. This dam cost over $50,000—an equal sum having been expended in securing, in like manner, the waste flow from four other smaller lakes in the vicinity. The books of this company show that they have constructed and purchased about two hundred and seventy-five miles of these aqueducts at a prime cost of more than $1,000,000. During the twelve years ending in 1867 their expense account reached $1,130,000; receipts for the same time being $1,400,000.

The works of the Eureka Lake and Yuba Canal Company consist of one grand trunk, commencing in four small lakes near the summit of the Sierra, and reaching to North San Juan, sixty-five miles, together with several side ditches purchased of other parties, the whole afterwards consolidated into one system. The principal source of water supply is Eureka lake, increased by damming from an area of one to two square miles, and a depth of sixty-five feet. The dam across its outlet, constructed of granite, is seventy feet high and two hundred and fifty feet long. The supply of water in this reservoir is estimated at nine hundred and thirty-three millions cubic feet, to which may be added a further store secured by damming the outlet of Lake Faucherie, and other smaller reservoirs, amounting to three hundred millions cubic feet. The main trunk, carrying the water from these reservoirs, is eight feet wide by three and a half deep, and has a fall of sixteen and a half feet to the mile, giving it a capacity of over three thousand inches.

The National and Magenta aqueducts, near Eureka, and which from their proximity, may be almost considered one work, exceed in magnitude and cost any other structure of the kind in the State. The former, resting on a scaffolding of immense timbers hewn from trees cut near by, is one thousand eight hundred feet long and sixty-five feet high—the latter, supported in like manner, has a length of one thousand four hundred feet, its greatest height being one hundred and twenty-six feet. This lofty and massive frame work, constructed of so many thousand enormous braces and beams, has been built in curves to give it strength to resist the winds that sometimes sweep with great force through the gorge that it crosses. The main canal, flumes and dams of this company, have cost very nearly one million dollars. The various canals and ditches, which, in December, 1865, became consolidated under the title now borne by this company, are the Eureka Lake canal, sixty-five miles long; Miners' ditch, twenty-five miles; Grizzly ditch, fourteen miles; the two Spring Creek ditches, each twelve miles long; and the Middle Yuba canal, forty miles long. In addition to these main canals there are many lateral and distributing branches, having a united length of over sixty miles, the whole making a total of two hundred and twenty-eight miles, the actual cost of which exceeded $1,500,000.

The Middle Yuba canal, taking water from the middle fork of the Yuba, at a point a little above Bloody Run, carries it in a ditch seven feet wide by four and a half deep to Badger Hill, San Juan, Sebastopol, Sweetland, Birchville, and French Corral, a distance of forty miles. It has a capacity of one thousand five hundred inches, and cost originally $400,000. The sum of half a million dollars is estimated to have been spent on projects commenced in 1853 for conducting water from Poorman's creek to Orleans, Moore's and Woolsey's Flats, and for carrying the waters of the Middle Yuba into the adjacent diggings, a portion of which were failures. Of the many subordinate ditches in this county which we have not the space to more fully notice, a number are extensive and costly structures, the aggregate expenditure on the whole having been not less than $1,000,000.

## PLACER COUNTY.

This county, so named from the Spanish term *placer*, signifying a place where gold is found mixed with the alluvial detritus, is bounded by Yuba and Nevada counties on the north, by the State of Nevada on the east, by El Dorado and Sacramento on the south, and by Sutter and Nevada counties on the west. In proportion to its length, it is the narrowest county in the State, being eighty miles long, east and west, and having an average width of but fourteen miles—a conformation due, as in the case of many other counties lying against the western slope of the Sierra, to the peculiar topography of the country. The rivers flowing in nearly parallel channels down this water shed having divided it into long elevated ridges, it has been found convenient, in many instances, to form the counties out of one or two of these ridges, making their northerly and southerly boundaries the streams running between them. Thus, in the case of Placer, we find Bear river forming, for a long distance, the dividing line between it, Yuba and Nevada on the north, while the middle fork of the American separates it from El Dorado county on the south. With so great an easterly and westerly elongation, the upper portion of the county rests upon the rugged summits of the Sierra, while the lower falls almost to a level with tide water.

As elsewhere throughout this entire tier of mining counties, the winter climate of Placer varies with altitude; the weather being warm and spring-like in the western, and even, mild and pleasant in the central sections thereof, while the eastern are deeply buried beneath the accumulated snows—the tops of the mountains being enveloped in almost constant mists and clouds, and their sides swept by frequent storms.

The north fork of the American river, running centrally through Placer, and the middle fork, cutting it on its southern border, have furrowed this county with terrific cañons, the gorges formed by these streams being from one thousand eight hundred to two thousand five hundred feet deep. In many places their sides have an average slope from top to bottom of more than thirty degrees. The narrowness of these chasms, only sufficiently wide, as a general thing, to give passage to the rivers flowing through them, accounts for the sudden and excessive rise that sometimes takes place in these streams, a stage of fifty or sixty feet above low water mark being reached in the course of a few hours. What further contributes towards these sudden rises, is the general steepness of the water shed about the sources of these rivers, which lies high against the precipitous declivities of the Sierra. With such a body of water rushing down a steeply inclined bed, some proper conception can be formed of the forces that have been operating to excavate these cañons; and when it is considered that a much greater quantity of rain fell on these mountains when the immense glaciers that once nearly covered them were melting away, we have forces supplied more than adequate to the production of these tremendous results. Even some of the tributary cañons to the main streams are very deep and narrow. Several of these, situated high up on the divide, measured by the members of the State Geological Survey, were found to vary in depth from one thousand six hundred to two thousand feet. The precipitous character of these ravines is made apparent by the fact that the summits of their opposing banks are often less than three fourths of a mile asunder, giving to their walls an average slope of nearly forty-five degrees. Observations made by the Geological Survey in certain of these cañons, situated in the vicinity of Last Chance and Deadwood, showed that the auriferous slates, here exposing a vertical section one thousand five hundred feet deep, have, in their upper portions, extending downwards ten or twelve hundred feet, the usual easterly dip of the formation, while, below this point they gradually assume a perpendicular position, and finally curve to the west, establishing their true dip at great depth to be in that direction, and supplying a striking example of the manner in which the upper portions of these slates have been forced over by the gradual pressure of the Sierra from above.

As elsewhere in the more Alpine regions of the Sierra, snow and land slides are of frequent occurrence in the upper portions of this county—hardly a season passing without one—and sometimes several deaths happening from these causes. The track of the Central Pacific railroad, as well also as some of the wagon roads leading over the mountains, have frequently suffered temporary obstruction from land slides—large patches, sometimes several acres of the steep mountain side, that have become saturated with water, slipping suddenly down and covering them to a depth of many feet, destroying the lives of men and animals overtaken by them. In some instances large sized trees, standing in their natural positions, are brought down on these detached masses, and continue growing as before. The snow slide, a similar phenomenon, is of more common occurrence than the land slide, being also more frequently destructive of life. In the month of March, 1867, a working party consisting of sixty men, employed on the Central Pacific railroad, at a point a little above Donner lake, on the confines of this county, were overwhelmed by a catastrophe of this kind, whereby seventeen of their number lost their lives, many of the survivors having been badly injured. In the same month, nine houses were destroyed, and a woman in one of them crushed to death, by an avalanche of snow, in the Kearsarge district, Inyo county. Near the scene of the first mentioned disaster, six stage horses were killed by a snow slide in January, 1868, while attached to a vehicle filled with passengers, all of whom escaped unhurt. In fact, scarcely a winter passes in which accidents of this kind, attended with fatal results, do not happen in some part of the

State—their more frequent occurrence in this particular neighborhood being simply due to the fact that two great thoroughfares, the Central Pacific railroad and the Donner Lake wagon road, lead through it, causing larger numbers to be exposed to their destructive force. These snow slides are caused by a sudden slipping down of great bodies of snow, and not by an agglomeration of the latter rolling and accumulating as it descends, after the manner of the avalanches that occur in the Alps. Where the body of snow moved is heavy a clear path is swept, immense trees being snapped off like reeds, and huge boulders carried along before the descending mass.

The whole of this county is well timbered, except the western portion, which, sinking into the nearly treeless plains of the Sacramento, is without other timber than a few oaks, growing mostly along the water courses. The business of lumbering is carried on extensively in the central and eastern parts of the county, which contain thirty saw mills, each capable of cutting from two to thirty thousand feet of lumber daily, and costing from two to ten thousand dollars. About two thirds of these mills are driven by steam and the rest by water. As is the case generally throughout the mining counties, rough lumber, at the mills, sells at prices varying from fifteen to twenty dollars per thousand.

Placer contains a considerable amount of good agricultural land, its western part being wholly devoted to farming, sheep, hog and cattle raising. About seventy-five thousand acres of land were enclosed in 1867, of which nearly two thirds were under cultivation. Of these, about six thousand were planted to wheat, five thousand to barley, and three thousand to oats ; a variety of other grains, with large quantities of butter, cheese, fruits and vegetables, being produced. In fact, Placer holds a conspicuous place among the mining counties for its orchards, vineyards and gardens, the number of vines and fruit trees planted being very large. There are three grist mills in the county—one, the Auburn City mill capable of grinding seventy-five barrels of flour daily—the others being of less capacity.

The present population of the county is estimated at twelve thousand, of whom one thousand two hundred are residents of Auburn, the county seat, once the center of a broad scope of rich placers, and in the vicinity of which a considerable amount of quartz mining is still being carried on. The votes cast in this county at the general election held in the fall of 1867 numbered two thousand six hundred and seventy.

Dutch Flat, an active mining town on the line of the Central Pacific railroad, thirty-two miles northeast of Auburn, contains a population of two thousand. The following places are also thrifty mining towns, some of them the centers of extensive quartz, hydraulic or tunnel operations: Gold Run, three miles southeast of Dutch Flat, in the vicinity of which there was produced from hydraulic washings during the year 1866, $350,000, and during the following year $500,000; Todd's Valley, eighteen miles northeast of Auburn, formerly the site of rich alluvial washings, and now a brisk hamlet surrounded with gardens and other evidences of taste and progress. Three miles north of this place is Yankee Jim's, one of the earliest camps in this section of country, and although the rich surface placers that once made it famous were long since exhausted, still rendered a busy locality by the hydraulic operations that have succeeded the more shallow diggings. Lying three miles east of this place is the stirring town and neighborhood of Forest Hill, containing about seven hundred inhabitants, and possessing one of the best cement ranges in the State, for the working of which material a large number of mills have been erected. Michigan Bluff, six miles southeast of Forest Hill, has a population of about one thousand. Wisconsin Hill, Iowa Hill, Illinoistown, Virginia, and Gold Hill, are all the headquarters and trade centers of considerable mining districts lying about them, the population of each being from three to six hundred. The most of these towns have constructed large reservoirs for supplying them with water obtained from the canals that generally pass near them. Several of the number are incorporated, and all contain a large proportion of pleasant homesteads, indicating the enjoyment of a high degree of independence and comfort among the inhabitants. Colfax and Cisco, both situated on the line of the Central Pacific railroad, are places of some importance—the former being the intersecting point for the business and travel of Grass Valley, Nevada, and other places further north.

At the general election held in 1863, the people of the county voted to subscribe two hundred and fifty thousand dollars for the capital stock of the Central Pacific railroad, which, entering the county near its northwestern corner, runs diagonally across it in a northeast direction, for a distance of more than fifty miles.

A heavy mass of auriferous detritus crosses this county from north to south, its thickness in some places being over five hundred feet. Occupying this gold bearing mass are the extensive hydraulic and cement mines found around Iowa Hill, Wisconsin Hill, Michigan Bluff and Forest Hill, the latter one of the most important cement mining districts in the State—this material here being so indurated that it requires to be crushed with stamps in order to release the gold. The mills running on this cement have generally obtained such favorable results that their number is being constantly increased, the opportunities for extending these operations being almost unlimited.

Placer contains within its limits forty quartz and cement mills—there being twenty-seven of the former and thirteen of the latter. The number of stamps in these establishments vary from five to forty—the whole amounting to nearly four hundred. Their individual cost has ranged from $2,000 to $50,000—the aggregate being about $300,000.

Ranking next to Nevada and Tuolumne, stands Placer in regard to the magnitude and cost of its water ditches, the Auburn and Bear River canal, in this county, being, with one exception, the longest single work of the kind in the State, as it is also one of the most costly and capacious. This magnificent improvement has a length of two hundred and ninety miles, inclusive of feeders and branches, and required in its construction an expenditure of $670,000. There are six other ditches in the county that cost over $100,000 each, and twenty of subordinate capacity, the cost of which has ranged from $5,000 to $50,000 each.

### EL DORADO COUNTY.

That the term *El Dorado* should have readily obtained a place in the geographical nomenclature of the interior of the State, will not surprise those familiar with the circumstances under which it was settled: nor was the name perhaps, inaptly applied to this particular county, since it was within its limits that the first gold was found, and here, for sometime, the pioneer miner met with his most steady and abundant rewards. This county has Placer on the north; a portion of the State of Nevada, and Alpine county on the east; Alpine and Amador counties on the south, and Sacramento and Placer on the west. Its length, east and west, is sixty miles, and its width thirty miles—its superficial area being nearly two thousand square miles. The middle fork of the American river separates it from Placer, and the Cosumnes, with its south fork, separates it from Amador county. The channel of the former is sunk far below the general level of the country, its average depth being more than two thousand feet. Three fourths of the county, embracing all the eastern and mountainous portions thereof, is heavily timbered. The lower section contains only a scattered growth of oak and pine, of inferior quality, the most westerly part being nearly destitute of trees.

Lumbering has always been prosecuted on a large scale in this county—having been early engaged in and steadily kept up. It now contains twenty-six saw mills, carrying forty-two gangs of saws, the most of them running with little interruption. The unnecessary waste of valuable timber, however, has here been deplorably great—trees from which ten or fifteen fine saw logs might be made having often been felled, and two or three, or perhaps half a dozen of the choicest cuts being selected, the balance has been left to rot on the ground. Frequently monster trees have been cut down with a view to their being split into shakes or shingles, when, should the first few cuts tried not happen to rive well, the whole has, in like manner been abandoned, the locality being, perhaps, too far distant from a mill to render the tree available for saw logs. This reckless destruction of these fine forests would not be so lamentable had it been restricted to this county alone.

There are numerous small valleys and alluvial flats in this county under cultivation—nearly all the cereals, fruits and vegetables grown in California being here raised with little trouble. In fact, this county may be said to contain a large percentage of farming land, since nearly one half its surface would be adapted to tillage, if cleared of timber. Owing to the circumstance that many of the fertile valleys and flats here, as well as elsewhere throughout the mining counties, contained rich deposits of gold, they have been completely destroyed by having all their alluvial soil washed away by the miner. Thousands of acres of valuable land have thus been irretrievably ruined, El Dorado having suffered largely in this respect. Fruits of all kinds, more especially apples, pears and peaches, are here raised in such abundance as to be of little or no value in localities remote from market. Even in the vicinity of many of the more populous towns, fruit is often produced in such excess of local wants—none of it, while green, being ever shipped away—that it can be had for the gathering. Lately, however, the business of drying certain kinds is being more largely engaged in, rendering it probable that its production will be more remunerative hereafter. A large number of vines have been planted, and are everywhere found to thrive well—El Dorado ranking third or fourth among the wine producing counties of the State. Some of the wines made here are highly esteemed, meeting not only with local favor, but having already obtained an extensive sale abroad. There are two grist mills in the county, having a joint capacity to make about one hundred barrels of flour daily.

The present population of this county is estimated at fifteen thousand, a large proportion of the inhabitants being women and children. Few of the mountain counties contain so large a number of small, well cultivated farms and comfortable homesteads as this; nor has the industry of any other been marked by a greater diversity of pursuits. The early construction of a railroad from tidewater to the western confines of this county, and its subsequent extension almost to the county seat, has done much, by facilitating the carriage of its products to market, towards establishing new branches of industry and stimulating the productive energies of the people. Through El Dorado, stretching along its whole length, lies the principal route by which the overland immigration has always entered California—the freight and travel hence to the silver regions of Nevada, and countries beyond, having, until recently, pursued also the same thoroughfare; keeping a constant tide of business flowing both ways through the county, to the enrichment of many who participated more directly in its benefits, and the great advantage of the inhabitants at large. In no county in the State has there been so much money expended in the construction of wagon roads as in this—the most of these enterprises consisting of toll roads built to secure the heavy trade across the Sierra, that sprung up on the discovery of the Washoe mines. Upon this class of improvements alone, more than a quarter of million of dollars has been expended, besides large sums spent on roads of minor importance. Towards the building of some of these works the county, in its corporate capacity, has contributed; the greater portion, however, has been executed by private, and, for the most part, local capital. The citizens of Placerville, the county seat, at a municipal election held in April, 1863, voted an appropiation of $100,000 towards aiding in the building of the Placerville and Sacramento Valley railroad; the people, at the general election of the same year, having voted, on behalf of the county at large, the further sum of $200,000 for the same purpose.

Placerville, the largest town in the county, has a population of about four thousand. It is distinguished for the number of its handsome churches, its excellent schools, and the enterprise, intelligence and orderly habits of its citizens. The town is supplied with gas and water works, and is so completely embowered in vines, trees, flowers and shrubbery, as to seem, when viewed from the surrounding hills, an almost continuous field of orchards, vineyards and gardens.

Coloma, located on the south fork of the American river, ten miles northwest of Placerville, has been rendered equally attractive by a profuse planting of vines and trees in and around it. Some of the most thrifty vineyards in the county are situated in the environs of this place—one of these being the property of James W. Marshall, the discoverer of gold in California—which event, having happened within the precincts of the town, must secure for Coloma (Sutter's mill, as the place was then called,) a conspicuous place in history. This vineyard comprises all the property that Marshall now owns, and to its culture he has for many years devoted his labor and attention. The extensive bar lying a little below the town on which the first washings were performed, has, through many re-workings, been almost wholly washed away—the old mill and the race below it, in which the first piece of gold was picked up, having long since disappeared. The adjacent river banks, once extensively worked—the old bar, and others a little further down, together with the ravines and flats in the surrounding district, having been well nigh exhausted. There has been for several years past but comparatively little mining going on in the vicinity of this once productive and ever memorable locality. Coloma contains, at the present time, about nine hundred inhabitants, scarcely half the number that dwelt in and around it in its more prosperous days. But, as most of the adjacent country has the advantage of a rich tractable soil, enjoys a fine climate, and is well supplied with timber, it cannot fail to become, in a short time, a prosperous farming district, there being already scattered over it many pleasant homes and broad grain fields.

Georgetown, an early, and once prosperous mining town, is situated on the ridge between the south and middle forks of the American river, fourteen miles north of Placerville. It has now a population of about five hundred, the former number of inhabitants having been greatly reduced through the exhaustion of the placers around it. A number of quartz veins are, however, being successfully worked in the neighborhood—the prospect promising well for an early extension of this business.

Taking the county seat for a starting point, we have the following mining towns lying around it in various directions, with the population of each indicated by the figures annexed, viz.: Diamond Springs, three miles southwest, 600; El Dorado, five miles southwest, 700; Grizzly Flat, twenty miles southeast, 400; Pilot Hill, twenty miles northwest, 400; Garden Valley, eleven miles northerly, 300; and Shingle Springs, nine miles southwest, 400; besides many mining camps and hamlets scattered over the county, and containing from fifty to two hundred and fifty inhabitants each.

Notwithstanding the gulch and bar diggings are pretty nearly worked out, there are in many parts of this county heavy masses of auriferous cement and detritus, that are being extensively and profitably operated upon either through hydraulic washing, tunneling or crushing with stamps. Many gold bearing quartz veins are also being developed, milling operations, for a time nearly suspended, having been very active during the past two years; and to suppose that a very prosperous future awaits this interest in El Dorado, would, in view of the abundance of fair grade quartz it contains, and the facilities that exist for its economical reduction, be by no means a violent assumption.

There are thirty quartz and eight cement mills in the county—the whole carrying four hundred and thirty-five stamps. Several of these mills have cost as high as $60,000 each, the aggregate cost having been about $400,000. There are also fifty water ditches, one of them, that of the Eureka Canal company, being the longest in the State, extending a distance of four hundred and fifty miles. The total length of these canals is one thousand two hundred and fifty miles, giving them an average length of twenty-five miles. The Eureka canal cost $500,000; the Pilot Creek, one hundred and fifty miles long, cost $300,000; the South Fork canal, but thirty-three and a quarter miles long, having, in consequence of its large size and the difficult character of the country through which it runs, cost an equal amount. The entire sum spent in the construction of these various works is very large, and although the revenues of many have been liberal, few have proved sources of profit to the proprietors, owing, in many cases, not more to the great cost of their construction than to the expensive and protracted litigation in which they have been involved.

Besides a number of manufacturing interests that are beginning to gain a foothold in the county, in a small way, it contains several tanneries, iron founderies, and similar establishments, all of moderate capacity. Some years since quite an extensive and profitable summer trade was inaugurated by the citizens of El Dorado, in bringing down ice, or rather the frozen and compacted snow found on the Sierra, and supplying it to the mining towns below—a business which has undergone considerable expansion since the construction of wagon roads into the mountains, whereby the transportation of this article, formerly carried on pack animals, has been cheapened and facilitated.

A great number of copper veins were located in the western part of this county about five years ago, upon which an immense amount of labor was, in the aggregate, expended. But, as little of this work was concentrated at any one point, none of these lodes were fully proven; and, although many small lots of rich ore were extracted, the permanency and value of the deposits remain undecided. That a large proportion of these veins will be shown, on more thorough exploration, to lack in persistence, seems probable, a few having already been proven mere segregated lenticular masses; others, however, exhibit more satisfactory evidences of permanency, and the prospect that El Dorado will find in this metal a source of much future wealth is thought to be encouraging. The first copper vein opened in the State, known as the

Rodgers mine, is located in Hope valley, formerly within the limits of this county, now a portion of Alpine. The vein here is small, but the ores are of high grade, and with better means of carriage, would pay well for shipment to market. For several years the reduction works about Virginia City obtained their supplies of copper from this mine.

El Dorado abounds with marble of excellent quality, there being at least twenty beds that, having been partially opened, give promise of making valuable quarries. The material is of all the varieties known to the trade—one deposit, near Grizzly Flat, being of an unclouded white, and more than three hundred feet thick; within this bed there exists an extensive grotto, consisting, so far as explored, of a succession of rooms connected by narrow passages. Some of these chambers are spacious and lofty, their entire length being seven hundred feet. Pendant from their roofs are numerous stalactites, imparting to them, when illuminated, a very brilliant appearance.

## AMADOR COUNTY.

This county, named, like several other localities in the State, after one of the early California families of Spanish origin, has El Dorado county on the north, Alpine on the east, Calaveras on the south, and San Joaquin and Sacramento on the west. It has a conformation not unlike that of Placer, being long and narrow. Its entire length, measured east and west, is fifty-two miles, and its average breadth ten miles. The Mokelumne river, separating it from Calaveras, forms its southern boundary throughout almost its entire length—the Cosumnes, on the north, dividing it from El Dorado, and forming two thirds of its boundary on that side. In its geology, topography, soil, climate, timber and other natural productions, it resembles the several counties last described, except that the river cañons here are not so deep, while the proportion of good farming land is greater. Formerly this county extended into and beyond the high Sierra, a distinction of which it was deprived in 1864, by the erection of Alpine county from the eastern portion of its territory; at present it barely reaches in that direction to the base of the great snowy range. The eastern section is, nevertheless, very rugged and broken, reaching a general altitude of between four and five thousand feet. The only isolated mountain, however, of any great height within its limits, is the *Butte*, so called, three and a half miles east of Jackson, which has an estimated elevation of one thousand two hundred feet above the town, and eight hundred feet above the country at its base. It is wholly of volcanic origin, has an irregular conical shape, and is often ascended for the sake of the fine views enjoyed from its top.

Running into this county from Calaveras is a heavy belt of limestone, penetrating to the town of Volcano, located near its center. A few miles to the northeast of this place the granite formation sets in, the upheaval of which composes the crest and peaks of the main Sierra. The overlying volcanic masses exhibit themselves in greatest strength towards the southerly line of the county, the auriferous slates appearing in the westerly and northwestern parts. All except the lower portions of the county are heavily timbered, and about twelve million feet of lumber are made every year, the most of which is required for home consumption. Many shakes and shingles are also made, there being several shingle machines in the county. The saw mills are twelve in number—two or three of large, and the balance of moderate capacity. With the exception of four flouring mills, two of large size, a tannery and a foundry, there is but little manufacturing carried on in the county. A large amount of money, however, has been expended in the construction of wagon roads and water ditches—not less than one million five hundred thousand dollars having been laid out upon the latter, and one hundred and fifty thousand dollars on the former. There are twenty-eight of these water ditches, and, although none of them are over seventy miles in length, the building of some has been very expensive. The Amador canal, taking water from the north fork of the Mokelumne river, and conducting it to Pine Grove, a distance of about sixty-six miles, cost over $400,000—the individual cost of several others having reached over $150,000. The largest and most expensive road in the county is that commencing at Jackson and extending across the Sierra to the head of Carson valley, opening wagon communication between the county seat and the State of Nevada. The aggregate length of water ditches is four hundred and twenty miles; the linear extent of improved wagon roads is about half that distance. The building of some portions of these roads lying through mountainous districts has been attended with heavy cost.

Situated among the lower foothills of Amador are some of the richest agricultural valleys in the State. Though of comparatively limited area, ranging from three to six miles in length, and from two to three in breadth, their yield of grains and fruits is not only certain but always prolific. In these valleys Indian corn grows well, three or four thousand bushels having been raised some seasons. The more fertile of these spots consist of Ione, Dry creek, Jackson, and Buckeye valleys, and the several deltas formed by these and other creeks. With comfortable farm houses, surrounded by orchards, gardens and grain fields, with their well fenced enclosures and a rich friable soil, covered with a scattered growth of ancient oaks, these valleys present the very ideal of rural felicity and enjoyment. Much of the hill land in this county has also been found well suited to the production of the cereals, and more especially of the grape, which here attains, both in size and flavor, its greatest perfection. Still higher up in the Sierra, and in some places lying upon its very summit, are many little dales and savannas covered with a variety of wild grasses, which, keeping green throughout the summer, afford excellent pasturage for large numbers of cattle; the herders from the valleys driving their stock thither during the dry season and returning them again to the plains on the approach of winter. In the winter these grassy spots are deeply covered with snow, which often remains upon them until late in the spring. In the center of some of them are small lakes, which, if shallow, are frozen over, the deeper remaining open all winter.

The population of Amador county is estimated at about 11,000. Jackson, the county seat, pleasantly situated on a creek of the same name, and in the vicinity of a group of valuable mines, contains one thousand inhabitants. The town having been nearly all burnt up in August, 1862, was soon after rebuilt, mainly with brick and other indestructable material, rendering the most of the houses fire-proof, and securing the place against the recurrence of a similar catastrophe. Sutter Creek, Amador and Drytown, lying northwest of Jackson, being on or near the main mineral belt running across the county, are all prosperous towns with valuable and productive mines in the vicinity. Sutter Creek contains, in and about it, a population of eight hundred; Amador six hundred, and Drytown seven hundred. Ione City, twelve miles west of the county seat, contains six hundred inhabitants. It is a beautiful spot, surrounded with fruitful, well cultivated gardens and farms, there being but little mining carried on in the neighborhood. Fiddletown, Forest Home, Lancha Plana, and Volcano, are all thrifty mining towns; the latter with a population of nine hundred, Fiddletown and Lancha Plana having each about half that number.

In a metaliferous point of view Amador is for its size an important county; a belt of auriferous earth and rocks about twelve miles wide, running entirely across its lower and most populous part. Along the westerly edge of this belt rests the *Veta Madre*, in which lies some of the most profitable and largely productive quartz claims in the State. First among these stands the Eureka, better known of late as the Hayward mine, the history of which, apart from the general interest it awakens, is full of instructive and encouraging lessons to all who now do or may contemplate becoming engaged in the quartz mining business. This claim, first opened in the spring of 1852, was for about one year worked with remunerative results, after which it not only ceased to be profitable, but failed to pay ordinary wages. In November, 1853, Alvinza Hayward purchased an interest in the mine, and becoming soon after half owner, continued working it for four years, but with such ill results that it had by the end of this time so completely impoverished him that the credit he enjoyed with the local traders was due more to his merits as a man than to any confidence felt in the prospective success of his mine. About this time, however, the character of the ores--the four hundred foot level having been reached—began to improve, and from thence on to the present the mine has continued to pay with constantly increasing profit; its total product during the past ten years having been $3,725,000, of which sum more than one half were nett earnings. The working of this claim has tended to establish a few very important facts considered in their bearing on this class of mines—the lode here, at a vertical depth of more than nine hundred feet, carrying not only a much heavier body, but a higher grade of ore than near the surface, its continuity having been preserved all the way down. The ore from this mine yields only about seventeen dollars per ton, the broad margin for profit arising out of its great abundance, the pay matter varying from sixteen to twenty feet in thickness, and from the facility with which it can be extracted and reduced, the gold being found mostly in a free state. The profitable ore in sight in this mine is estimated at seven hundred thousand dollars.

On this belt, lying both to the north and south of the Hayward mine, are a number of claims that, through extensive exploration and practical working for a series of years, have been proven to possess a high value. Of these, the Keystone, near Amador city, owned by J. W. Gashwiler, of San Francisco, and others, and which was opened even earlier than the Hayward mine, is now yielding, under an extensive system of working, very ample returns. In 1852 a five-stamp mill, afterwards increased to twelve, was put up for crushing the rock from this mine. In 1857 this mill was superseded by another of twenty stamps, which, becoming much worn through long use, was in 1866 supplanted by another establishment of similar capacity, but of improved model and build, which has since been running steadily and with highly satisfactory results. The deepest working levels on this lode are now three hundred and seventy-five feet beneath the surface, at which point it is well walled and carries a body of pay matter, varying from three to twenty-five feet in width, the thickness here being somewhat irregular. For sometime prior to 1863 work was suspended on this mine owing to the accumulation of water in its lower levels. Having been relieved of this by the present management, the gross product has since been $600,000. The dividends for several years past have varied from $6,000 to $12,000 per month; the total nett earnings disbursed to owners between October, 1865, and the middle of January, 1868, amounting to $212,000.

The other mines situated on this mineral range, noted for the marked success that has attended their working throughout a number of years, or for the prospective value that justly attaches to them, are the Enterprise, operating successfully with a ten-stamp water mill—ore averaging seven dollars per ton ; the Plymouth, working profitably a twenty-stamp steam and water mill, the company having divided $20,000, on a moderate investment, during the past five years ; the Potosi, with a sixteen-stamp water mill, running steadily and making fair earnings ; the Seaton, after a varied fortune, extending through several years, during which dividends and assessments alternated in about equal proportions, now a prosperous, well conducted mine, exhibiting a good body of pay ores at a depth of four hundred and eighty feet, operating on which the company have erected a forty-stamp mill, furnished with all recent appliances and improvements—and in brief, the Italian, Loyal, Bunker Hill, Amador, Stanford, Hubbard, Mahoney, Spring Hill, Oneida, Wilder and Covey, with perhaps several others, all at present in a productive condition, or likely soon to become so.

Lying within this belt, near its easterly edge, there are also many promising quartz veins, some of which have been thoroughly explored, and have for many years past been paying well, and in a few cases very largely. The most of these mines are situated near the town of Volcano, in the vicinity of which there are fourteen quartz mills, nearly all now operating with success.

In this and the adjacent districts there are also some hydraulic claims being worked, though placer mining is not now, in any of its branches, carried on extensively in this county, the gulch and river diggings having been exhausted long ago.

The quartz mills now completed in Amador number forty-two, carrying six hundred and thirty-two stamps, the whole erected at an original cost approximating $750,000. Several of these mills are now running on the cement, or on the talcose slate and ochreous gossan found at various points in the county, and as these deposits are extensive, it seems probable that many others will be put up for the same purpose in the early future. The era of quartz mining and mill construction was inaugurated at a very early period in this county—the first mill put up on the old Amador mine in 1851 having been the second establishment of the kind erected in the State. After encountering the vicissitudes incident to the business in its early stages elsewhere, vein mining for gold is now firmly established as a profitable and permanent pursuit in this county; which probably holds out as good inducements for investing in this industry as any other county in the State.

Lying on the eastern confines of Amador, a number of silver bearing lodes were discovered some five or six years ago, but as none of them were ever developed to a productive point, nothing definite is known as to their value; though, owing to the great facilities that exist for reduction, a very low grade of ores could be worked there with profit, did they exist in abundance.

Copper, about the same time, was found in various parts of the county; and although some of the veins proved exceedingly rich, at least in their upper portions, this class was not generally of large size. The problem of their permanency never having in any case been solved by deep exploration, it would be premature to assign this metal, even prospectively, a prominent place in the mineral staples of the county.

Marble of different varieties and good quality exists in many parts of Amador; and also sandstone, the latter underlying a terrace-like hill, being one of a series near the town of Ione, composed chiefly of alternate strata of clay and gravel, capped with trachyte. The upper part of this bed of sandstone is in places so highly ferruginous as to form a tolerable iron ore. It is now quarried for fencing and building purposes, and may in the future be utilized in a more important way. The clay strata above mentioned being composed of various colors, is also dug out and turned to practical account by being ground and used for paint.

At Fiddletown, Volcano, and at other places in the county, small diamonds have frequently been picked up, some of them worth fifty or sixty dollars in the California market. They usually occur in the alluvial drift, and their finding thus far has been accidental, the miners meeting with them when washing down their sluices preparatory to cleaning up. If this class would take the trouble to familiarize themselves with the appearance of the uncut diamond, it is believed many more of these gems might be gathered, with no further trouble than an increased attention while pursuing their ordinary vocation.

## ALPINE COUNTY.

This county, in view of its great altitude and the rugged and precipitous character of the mountains that cover nearly the whole of its surface, has been altogether significantly and aptly named. Lying on either side of the Sierra Nevada, it covers that range at one of its most broken and lofty points; a rugged, and scarcely less elevated spur, striking northerly from the main chain crossing its eastern border, thereby rendering nearly the entire county one continuous mass of mountains. Several peaks of the Sierra, within the limits of Alpine reach a height of nearly eleven thousand feet; Silver mountain, the loftiest portion of this northerly trending spur, being over ten thousand feet high. Alpine is bounded on the northeast by the State of Nevada; on the south by Mono and Tuolumne; on the west by Tuolumne, Calaveras and Amador, and on the north by El Dorado county; its average length, measured north and south, being forty and its breadth thirty-eight miles. This county is well watered, the portion lying east of the Sierra being cut in every direction by the two main forks of Carson river and their numerous tributaries, the Stanislaus and the Mokelumne both having their head waters within its limits. Forming the sources of those several streams are numerous small lakes, the most of them situated on the summit of the mountain, where it spreads out into a sort of table land. Many of them are very wild and beautiful, being skirted by belts of grass or bordered by plats of lawn-like meadow lands. In some instances they are destitute of these grassy surroundings, being closely hemmed in by dark forests or shadowed by impending cliffs of granite. Two of their number, situated near each other, and from this circumstance and the cerulean hue imparted to their waters by their great depth, named the Twin Blue Lakes, constitute the head fountains of several large streams that make their way westward into the Pacific; while, in close proximity, are the sources of the Carson, flowing eastward to be swallowed up in the great deserts of Nevada. Some of these lakes are shallow, while others, as we have seen, have a great depth; and being fed by the melting snows, never tarnished at these great altitudes, are always wondrously clear and pure, rendering them the acceptable abode of the coy and delicious mountain trout. They all contain fish, and being as well the resort of wild fowl during the summer, they form at this season a favorite haunt for the hunter and angler.

There are also in this county many grassy, well watered valleys, rendered the more attractive by their rugged and desolate surroundings. Into these the herdsman from either side drive their cattle for pasturage during the summer, removing them as winter approaches, the snows in the higher of these valleys always falling to an immense depth. Owing to the great altitude of the county, and the limited amount of good land it contains, but few attempts are made at cultivating the land, except in the way of raising vegetables, of which, as well as of milk, butter and hay, enough are produced for home consumption. The quantity of land enclosed does not exceed ten or twelve thousand acres, the amount sown to grain not being over a thousand or fifteen hundred. Barley, with irrigation, often yields well, though not being ready for the sickle till the month of September. Most kinds of berries and a few hardier fruits have been found to thrive here, wild currents and several species of berries being indigenous to the country. Flax and tobacco are also natives of the soil, and many varieties of wild flowers flourish during the short period of summer.

There being little occasion for grist mills none have ever been erected in the county. Neither have any water ditches been constructed, other than a few of small capacity designed for irrigating purposes. There are, however, thirteen saw mills, some of them of large capacity; lumbering in its various branches being, next to mining, the most important interest in the county. Apart from the lumber made for supplying local wants, many thousand saw logs and several thousand cords of fire wood are annually cut along the banks of the east fork of Carson river, and floated down that stream for supplying the large steam saw mill at Empire City, and the immense demand for fuel created by the ore mills working the Comstock ores. Alpine abounds in spruce and pine forests, the timber on the higher Sierra being of large size, while that on the eastern slope and beyond is of inferior quality.

The great active interest in this county is, however, and always will continue to be, vein mining, upon the success of which it must mainly depend for whatever advancements it may make in wealth and prosperity.

The citizens of Alpine have evinced a commendable zeal in the construction of wagon roads, several of which have been built at great expense, connecting the more populous districts with Carson and Walker river valleys; and also others, at still heavier cost, across the Sierra leading into California.

Beside Silver Mountain, the county seat, with a population of three hundred, Alpine contains several other small towns and mining hamlets, of which, Markleeville, having about four hundred inhabitants, is the principal. Mogul, and Monitor, are the centers of two important mining districts situated near the east fork of Carson, the latter having a population of two or three hundred. The entire population of the county numbers about twelve hundred.

The mines of Alpine consist almost wholly of argentiferous lodes, though a few gold bearing veins and masses of quartz have been found, some of them of great richness, in the Mogul district. The ledges here are usually of large size and crop boldly, being often traceable for miles by their surface projections. While a vast amount of work has been expended upon them in a small way, but little exploratory labor of a thorough and systematic kind has been performed, consequently, scarcely a single prominent mine in the county has been fully proven. Several have been developed to a point of limited production, but not until greater depths shall have been reached can the question of their ore yielding capacity and intrinsic value be fully settled. Owing to the tremendous upheavals of this region the lodes here, though often strong and compact in their surface developements, are probably deep fissured, while in many cases they are found to have suffered much displacement and disturbance in their upper portions.

Should they prove persistent in depth, and continue to carry ores of no higher grade than are found near the surface, the veins here could generally be worked with profit, owing to their immense size and the unsurpassed facilities that everywhere exist for the economical extraction and reduction of their ores. Running in most cases across the tops, or along the slopes of precipitous mountains, they can be opened to great depths by comparatively short adit levels driven in from the base. For example, the Mountain ledge, running parallel with and near the crest of the high ridge overlooking the county seat, has been opened to a vertical depth of nearly twelve hundred feet below its croppings by means of a tunnel scarcely more than fourteen hundred feet in length, there being many other lodes in the district equally well situated for deep exploration.

In regard to supplies of wood, whether required for fuel or lumber, and also of water, whether to be used for propelling machinery or other purposes, Alpine is almost without a rival on either the California or Nevada side of the Sierra. Three fourths of the county is heavily timbered with spruce and pine, and more than ten thousand stamps might be driven by the water power here found convenient to the principal mines. With such advantages the working of the ores of this region could be made highly remunerative, even should they prove of low grade, were they only abundant and tolerably tractable. Tested by assay they have not generally indicated great richness, though several extensive working trials have given fair and, in a few instances, large results. From the IXL lode, situated on Scandanavian cañon, two miles northwest of Silver mountain, one hundred tons of ore were, a year since, extracted and sold to the neighboring millmen at the rate of $100 per ton, delivered at the mouth of the tunnel. From divers small lots of this ore, sent to San Francisco for reduction, a sum total of $40,000 has been extracted. From the Tarshish lode, located near the town of Monitor, a large quantity of high grade ore has been raised, and from the number of rich pockets that have been found in this mine at no great depths, it is inferred that larger and equally rich deposits will occur at lower levels.

The ores from this mine having been found intractable to the amalgamating process, furnaces have been erected for treating them by smelting—a mode that will probably have to be employed upon a large proportion of the contents of other mines in the county, much trouble having heretofore been experienced in their management. Should this prove to be the case, fuel is fortunately in such ample supply as to render reduction by this method everywhere practicable.

There are three quartz mills in the county—one at Markleeville, and two near Silver mountain,—the whole carrying twenty-six stamps, and costing about $100,000. Smelting works, on a limited scale, have also been put up at Monitor for reducing the ores of the Tarshish mine, and which, should it prove successful, will probably be followed by the erection of similar establishments elsewhere in the county.

### CALAVERAS COUNTY.

This county, which derives its name from the Calaveras river running centrally through it, is bordered by Amador on the northwest, by Alpine on the northeast, by Tuolumne on the southeast, and by Stanislaus and San Joaquin counties on the southwest. The Mokelumne river separates it from Amador, and the Stanislaus river from Tuolumne county. It has an average length of forty miles, with a width of about twenty; and in everything that relates to topography, soil, climate, mines, agricultural and other natural productions, is almost the counterpart of Amador county. Bear mountain, a rocky, wooded range, a little more than two thousand feet high, strikes northerly across the middle of the county, from the Stanislaus to the Calaveras river, dividing this central portion into two sections; the lower, composed of abrupt foot-hills that gradually subside into low, rolling prairies, as they stretch west towards the great San Joaquin valley, while the upper grows more rugged and broken as it extends eastward into the main

Sierra. The former includes the copper mining district, as well, also, as many valuable quartz lodes, together with the gossan deposits of Quail Hill and Iron mountain. Placer mining is profitably conducted at a number of localities within this belt, which, from an early period, has been noted for its rich surface diggings. The easterly section is, however, the present theatre of more active operations in quartz, there being within its limits a large population engaged in this business. The upper and steeper slopes of the foot-hills are covered with scattered groves of oak, interspersed with an inferior species of pine, buckeye, manzanita, and other shrubby trees. Large patches are covered wholly with the chamiza, an evergreen shrub with a delicate leaf, which, seen from afar, gives to the mountains a beautifully dark umbrageous appearance. These foot-hills are without running streams in the summer, and, although covered in many places with an extremely rich soil, and affording a considerable amount of grass, are but indifferent stock ranges, owing to their aridity. With the exception of the Calaveras, wholly diverted from its bed during the dry season for irrigation and mining purposes, there is in the summer no water but such as may be found in springs and standing pools, or as is furnished by artificial means, between the Stanislaus and Mokelumne rivers, a distance of twenty-five miles. Nearly the whole of the county, however, except the southern extremity, is well supplied with water through an elaborate system of canals; which, obtaining their principal supplies from the Stanislaus and Mokelumne rivers and their branches, conduct this element to all the leading mining camps, where it is employed, not only for hydraulic and sluice washing, but to a considerable extent also for the propulsion of machinery. There are sixteen of these canals, varying in length from seven to fifty miles, and in cost of construction from $10,000 to $350,000; the largest and most expensive in the county, that of the Union Water Company, having cost the latter sum.

A good deal of money has been expended by the citizens of Calaveras in the construction of wagon roads, with which all parts of the county are well supplied. Towards the building of the Big Tree and Carson Valley road, leading over the Sierra, the people of the county, at their general election in 1863, voted an appropriation of $25,000; on which occasion a further sum of $50,000 was voted for subscription to the capital stock of the Stockton and Copperopolis railroad.

Lumbering is carried on here to a moderate extent, there being ten saw-mills in the county. All but three are driven by steam, and several have a capacity to make between twenty-five and thirty thousand feet of lumber daily. There are a number of small iron foundries, tanneries, and similar establishments in the county, but manufacturing generally is not largely engaged in.

Agriculture, viniculture, and stockraising receive a good deal of attention in Calaveras, many portions of the foot-hills being well suited to the growth of the cereals ; while in the valleys along the streams and in the mountains, a wide variety of fruits, berries, and vegetables find a congenial home. In the year 1867 there were about 70,000 acres of land enclosed, of which nearly one half was under cultivation, the principal grains raised being wheat and barley. The assessment roll for the same year footed up nearly $2,000,000, exclusive of mines.

The population of Calaveras is estimated at 14,000, of whom a large proportion, fully one sixth, are Chinamen. Nearly all of these people, as well as two thirds of the whites, are engaged in mining, this being the leading pursuit of the inhabitants.

Mokelumne Hill, a thriving town, situated near its territorial centre, contains about twelve hundred inhabitants. The rich placers once found in its vicinity are now pretty well exhausted, still there are many claims being worked in the deep banks and flats near by, some of which continue to yield liberally and will last for many years to come.

San Andreas, with a population of twelve hundred, one third of them Chinamen, is located ten miles southwest of Mokelumne Hill, from which it does not materially differ in its surroundings. Some rich gold bearing quartz and cement mines have been discovered within a few miles of the town, for the crushing of which several mills have been erected ; and, judging from the favorable results thus far obtained, there is little doubt but others will shortly follow.

In the vicinity of West Point, a prosperous and growing mining town seventeen miles east of Mokelumne Hill, there is a broad scope of exceedingly rich quartz veins, and also deposits of auriferous gravel which promise to furnish profitable hydraulic mining for years. Extensive crushings made of the quartz obtained from lodes at Railroad Flat, and other localities in the neighborhood of West Point, establish for this a high character as a quartz mining section, the yield ranging from twenty to one hundred dollars per ton, very much of it exceeding fifty dollars to the ton.

Vallecito, Jenny Lind, and Campo Seco, each with a population of between three and five hundred ; Clay's Bar and Chile Gulch, with a population of three hundred each, and Rich Gulch, with scarcely so many, are all in the midst of placer diggings, once extremely rich, and some of which still continue to pay fair wages. There is also considerable attention being paid in some of these districts to the business of quartz mining, additions being constantly made to the mills now in operation. Railroad Flat, Altaville, Fourth Crossing, Poverty Bar, Robinson's Ferry, and Musquito, are all mining hamlets, with from fifty to two hundred inhabitants residing in and immediately about them, and surrounded with mines similar in character, though generally of less extent to those in the vicinity of the larger towns just described.

Angel's Camp, twenty miles south of the county seat, containing about six hundred inhabitants, is one of the earliest settled towns in the county. Growing suddenly up under the support afforded by the rich placers about it, and flourishing for many years, it gradually declined as the diggings around it became impoverished, until the inhabitants, ten years ago, amounted to scarcely one half their present number. After languishing in this reduced condition for several years, the surface placers nearly exhausted and property depreciated to mere nominal prices, the attention of the mining public began to be attracted to the business of opening and working the quartz veins that abound in the neighborhood. The early efforts directed to this end were not, however, more successful here than elsewhere in the State, much fruitless experimenting having been made and much money spent before these first endeavors were rewarded with even a moderate degree of success. At length, however, this interest has been placed upon a permanent and prosperous footing ; and although the average yield of the ore here is not large, only from six to ten dollars to the ton, the mills, of which there are five near the town, are all being run with profit ; the earnings of one or two, working a higher grade of ore than the average, being quite large.

As an example of what the better class of mines, when well managed, are able to accomplish at this camp, we instance that of the Bovee claim, which, aided by a ten stamp mill, turned out $44,528 for the ten months ending with January 1st, 1868, the total expenditures on account of this production, including some of an extraordinary character, having been $25,512. This lode is now opened to a vertical depth of one hundred and fifty feet ; having increased steadily in volume from the surface down, the ores undergoing, at the same time, a corresponding improvement, having advanced from an average yield of fifteen dollars on top to over twenty dollars at present working depths. And as the same general experience has attended the development and working of other veins in the vicinity, it is inferred that they will all yield a much higher grade, and a larger amount of ore, when more considerable depths are attained.

Under the stimulus of this new interest, Angels Camp has during the past few years not only advanced in population, but has exhibited other marked evidences of improvement, many cottages having been erected by the miners, who find employment in the service of the quartz companies, and much planting of trees and vines having been practiced, to the beautifying and enrichment of the place. These remarks, while they apply with peculiar force to Angels, might be employed with more or less truth in speaking of Murphy's Camp, and several other towns in the county, including most of those already alluded to.

Carson Hill, justly styled by Professor Whitney, because of its early fame, the classic mining ground of California, lies five miles southwest of Angels Camp, looking down from its lofty eminence upon the dark waters of the Stanislaus, flowing more than a thousand feet below. From no space of equal dimensions, perhaps, in the State has more gold been taken out than from the Morgan ground, the discovery claim on this hill; the sum extracted, with simple appliances and at small expense, between the time of its discovery, in 1850, and the year 1858, having approximated $2,000,000; the amount taken from the Madam Martinez claim, near by, and under nearly similar circumstances, having been over $1,000,000 during a period of less than three years. The total amount of bullion obtained from this hill is estimated at over $4,000,000, though the working of most of the claims, of which there are a number besides the above, have been greatly interfered with by injudicious management and vexatious litigation.

At Frankfort, formerly Cat Camp, in the vicinity of Camanche, an old mining town of about four hundred inhabitants, situated twenty-two miles southwest of the county seat, there were discovered in the summer of 1867 a great extent of surface placers, which it was believed from careful prospecting would pay fair wages. A branch ditch having been completed in December of that year, carrying water into this district, a population of several hundred previously attracted to it were washing with good average results during the following winter and spring, with a prospect of having remunerative work before them for a number of years.

Copperopolis, the business center of the rich and extensive copper mines in this county, is situated twenty-eight miles southwest of Mokelumne Hill. Its present population is about eight hundred, somewhat less than it was a few years since, when operations were much more active than they have been of late. The town, having suffered severely from fire nearly two years ago, has not since been fully rebuilt, though there is little doubt but it will not only regain its former full proportions, but much enlarge the same, as well as experience a restoration of its former business activity, when the prices of copper ores shall have recovered from their present extreme depression.

Telegraph City, situated on the Stockton road, six miles west of Copperopolis, and on the more westerly and least important of the two cupriferous belts extending north and south across the county, contains about two hundred inhabitants; its population and business having experienced a material falling off during the past two years, from the same causes that have operated to the detriment of its more advanced neighbor.

Of the cupriferous deposits on these twin ranges, separated by Salt Spring valley, it may suffice in this place to say, the average of ores obtained have been of very fair grade, ranging at first, as sent to market, from fifteen to twenty-five per cent., and latterly from twelve to fifteen per cent. of metal. While none of these veins can be said to have been sufficiently proven to establish their permanency beyond contingency, it is well settled that many of them, though rich in metal, are mere lenticular masses of no great magnitude, and consequently of but little value. That others, however, will be found more persistent, hardly admits of a question, shafts having been sunk on a number of them to the depth of several hundred feet, without serious displacements or contractions in the vein matter being encountered. At one time, during the heat of the excitement that sprang up soon after the discovery of these mines, they were sold freely at rates varying from $500 to $2,000 per linear foot. At present, owing to their unproductive condition, the best of them are without any certain value in the mining share market, a state of things that it is believed, cannot be of long continuance.

A few years since a bed of opals was discovered in Stockton Hill, an eminence near the county seat, from which a French company, claiming and working the same, have since extracted a large number of these stones, some of them said to be of considerable value. It does not appear that the precious opal has yet been found here, though experts and geologists are of the opinion that these gems will be met with when the stratum is more fully explored.

One of the greatest curiosities in California, and, indeed, of its kind in the world, consists of the Big Tree grove, situated on the divide between the middle fork of the Stanislaus and the Calaveras river, about twenty miles east of Mokelumne Hill, and at an elevation of four thousand seven hundred and fifty-nine feet above the level of the sea.

The number of these trees, a species of redwood bearing the botanical name of the *Sequoia Gigantea*, is ninety-two, ten of which are at least thirty feet in diameter; eighty-two having a diameter varying from fifteen to thirty feet. Their height, as they now stand, ranges from one hundred and fifty to three hundred and twenty-seven feet, the tops of many of the more aged having been broken off by the tempests or snow. The original height of some is believed to have been over four hunhundred and fifty feet, and their diameter at least forty feet. Through the prostrate trunk of one of these trees, which has been hollowed out by fire, a man can ride on horseback for a distance of seventy-five feet. Some years ago one of the largest of the number then standing was cut down, with a view to secure transverse sections of the trunk for exhibition. It was ninety-two feet in circumference and three hundred feet high, and it required the constant labor of five men for twenty-two days to fell it—the work being accomplished by means of boring with long augers. At the same time, another tree of nearly equal dimensions, was stripped of its bark for a distance of one hundred and sixteen feet from the ground, a lofty staging having been erected about it for the purpose. The bark was taken off in longitudinal sections, which being afterwards replaced in their proper order, reproduced the exterior of this giant of the forest—having much the appearance that it presented while growing. Such was the wonderful vitality of this tree that many of the branches still continued green for seven or eight years after this extensive mutilation.

By carefully counting the concentric rings, denoting the annual growth of these trees, their age is found to vary from one thousand two hundred to two thousand five hundred years. In some places these trees are separated by spaces of several rods, while in others they stand quite close together, some being united at the roots, and having grown almost into one, which, when they first sprouted, were twenty or thirty feet asunder.

The *Sequoia Gigantea* has two sets of leaves—the one small and shaped something like those of the spruce or hemlock, and the other shorter and of triangular form, the cones being scarcely larger than a hen's egg. The bark is very much like that of the cedar family, and is generally from six to eighteen inches thick, according to the age of the tree. The wood in nearly every particular, except odor, resembles red cedar.

The Calaveras grove, though really one of the most remarkable, and, from its accessibility, by far the most frequented, is not the only one in this State, there being three groups of Big Trees in Mariposa, one in Tuolumne, and another in Tulare county, with, perhaps, others not yet discovered in the adjacent but less explored portions of the Sierra Nevada.

### TUOLUMNE COUNTY.

As we proceed south along the great mineral belt, the counties further north, mostly of limited area, begin, after passing Calaveras, to increase in size—Tuolumne having an average length of sixty with a width of thirty-five miles. It lies between Calaveras and Alpine on the north, and Mariposa on the south, and between Mono on the east and Stanislaus and Calaveras on the west. In its topography and productions it is so nearly assimilated to the mining counties further north, already gone over, as to require little more to be said on these points.

The Stanislaus river separates this county from Calaveras on the northwest, the south and middle forks of that stream and the Tuolumne with its branches running across the county in a southwesterly course, cutting it with numerous deep cañons. Both these rivers, as well as many of their confluents, carry heavy bodies of water at all seasons of the year; and, heading high up in the Sierra Nevada, become, when swollen by sudden rains or the melting of the summer snows, large and rapid streams, rising often in the mountain gorges to an immense height above ordinary stages, and overflowing their banks after they have descended into the plains.

This county has been pronounced by the State Geological Survey one of the richest fields for scientific study to be found in the State; more of the remains of the mastodon, elephant, and other large animals being found in the district northwest of Columbia than in any other locality in California, with the exception of Kincaid Flat. At Texas Flat there is a vast accumulation of calcareous tufa formed over the auriferous gravel, in an ancient gulch emptying into the Stanislaus, when that river was at a much higher level than at present. This same formation occurs on the bank of the Stanislaus, where it rises in picturesque cavernous cliffs resembling coral reefs. In this tufa are found the bones and teeth not only of the above gigantic animals, but also of the horse and other mammalia, together with land and fresh water shells.

One of the most striking features in the topography and geology of this county is the "Table Mountain," masses of basaltic lava with perpendicular sides and flat on the top, which extend for a distance of nearly thirty miles with their windings. The top of this mountain is elevated about two thousand feet above the Stanislaus river, near which it runs a good part of the distance, this stream frequently breaking through it. It varies in width from twelve hundred to eighteen hundred feet; the basaltic mass forming the Table Mountain proper being about one hundred and fifty feet thick. This portion, which has perpendicular sides, stands on a deep bed of detrital matter that slopes from its base down to the river or the country adjacent.

The space occupied by this wall-like mountain was once the channel of an ancient river having precipitous banks. At a point on the latter where this formation begins, a stream of lava ejected from a neighboring volcano entered it, and flowing steadily down filled it full. The country along the banks of this stream, consisting doubtless at that period of high mountain ranges, has since been eroded by the action of the elements and all washed away, leaving this mountain, composed of more solid matter, standing in the condition we now find it. What strengthens the presumption that these singular formations occupy the beds of former rivers, is the fact that the bed rock beneath them is water worn, after the manner of fluvial action, and contains rich deposits of washed gold; many of the best paying mines in the county, consisting of these old channels, are now regularly worked by an elaborate system of shafts and tunnels.

Although the leading pursuit of this county is mining, it contains many small, well tilled farms, together with fruitful gardens, orchards and vineyards—Tuolumne being distinguished for the excellence and abundance of its fruits and grapes.

The amount of land enclosed was estimated in 1867 at thirty-five thousand acres, of which about twelve thousand were under cultivation—all the cereals usually raised in California being planted. Much stock is also kept in this county, the dairy products being ample for every home demand.

Lumbering is also extensively carried on, large quantities of sawed timber and shingles, after the local consumption is met, being annually sent to Stockton for a market. There are sixteen saw mills in the county, seven of which are driven by water and nine by steam. Their cost has varied from two thousand to twenty thousand dollars each, several having capacity to cut eight thousand feet of lumber daily.

A number of costly roads have been built in Tuolumne, towards the construction of which the county has in some instances lent its corporate assistance. One of these roads extends across the Sierra to Mono county, and being the shortest wagon route between tide water and the Esmeralda mining region, is likely to command considerable travel hereafter. Already it has served as a convenient channel for transporting the fruits and surplus farming products of Tuolumne to the mining towns and camps east of the mountains, where they always command a ready sale at remunerative prices.

Tuolumne contains a population of about fifteen thousand, of whom a considerable portion are Chinamen. Sonora, the county seat, numbers about two thousand five hundred inhabitants. The place was first settled in the summer of 1848 by a company of miners from Sonora, Mexico—hence the name. So rapidly did it grow in consequence of the extremely rich placers found around it, that in a little more than one year it contained nearly five thousand inhabitants. Sonora has suffered its full share from conflagrations, the greater portion of it having been several times destroyed by fire. For many years past the mines in the vicinity have been considerably depleted, yet it still continues to be the base of supply for a large circle of mining country about it.

The town of Columbia, four miles north of Sonora, and containing a little more than half the population of the latter, is surrounded by a similar character of mines, and has a history not very unlike that of its neighbor, though not settled for nearly a year and a half later.

Shaw's Flat and Springfield are small towns between Sonora and Columbia, having an aggregate population of three or four hundred. Jamestown, a hamlet of several hundred inhabitants, five miles south of the county seat, was early settled, and for several years was the center of an exceedingly prolific placer district. In the neighborhood extensive tunnels have been driven under Table Mountain, overlooking it from the north.

Montezuma, Chinese Camp, Jacksonville, Tuttletown, Gold Spring, Poverty Hill, Big Oak Flat, and Garote, have all been in their day mining towns of note, containing from five hundred to one thousand inhabitants, and some of them for a short time many more. They have nearly all, however, declined, as the diggings about them grew poorer, until some have not now half their former population. With the discovery of quartz they are generally beginning to revive, and it is not improbable that many will, in the course of a few years, contain even a greater number of inhabitants and become more prosperous than before.

Connected with the early history of these towns, as well also as with that of various smaller places in the county, are many strange and tragic events, the original population of this region having been largely made up of rough and desperate characters collected from all parts of the world. Hither flocked the people of Spanish origin, adventurers who had spent their lives on the southern and western frontiers, and hither swarmed the gamblers and men of desperate fortunes from every land under the sun ; the very character of the diggings, rich beyond example, but less certain than elsewhere, naturally serving to attract these classes to this quarter. A record of the rich strikes, the popular tumults, the deadly affrays, the executions without law, and the murders without punishment, that occurred during these early times, would fill a large volume. All those excitements —those exhibitions of private vengeance and popular passion—those scenes of ferocity, violence and crime, that have given California such unenviable notoriety, found here their most frequent and forcible illustration. Yet, notwithstanding these scenes of turbulence and crime, and the many unhappy events connected with the primitive history of this country, the present inhabitants of Tuolumne are not, perhaps, in the matter of social and moral standing, behind any other community in the State.

Placer mining, except as performed by hydraulic washing, or through shafts and tunnels reaching into the ancient river channels and gravel beds, is not now extensively practiced in this county. By the above means, however, as well as by a considerable amount of surface washing performed in certain localities during the winter, large quantities of gold are annually taken out ; and as the bank diggings are in many places very deep, and the auriferous gravel of great probable extent, this branch of mining seems likely to be pursued here for an indefinite period, and with at least moderately good results.

Among the quartz lodes that have from time to time been signalized by unwonted success, is the Soulsby claim, near Sonora, which, several years ago was conspicuous in this respect. A multitude of ledges are now being worked along the auriferous belt that crosses the county, generally with fair, and often with munificent returns. There are now forty-eight quartz mills in operation, carrying five hundred and forty stamps—the whole erected at an aggregate cost of about $550,000.

Situated on the mother lode, striking across the westerly end of this county, are a number of quartz claims, that, tested by a successful experience of several years, may justly claim to rank among the leading mines of the county if not also of the State. In this catagory stands the Rawhide Ranch claim, lying on the west side of Table Mountain, a few miles west of Sonora. The lode, having an average width of twelve feet, has been explored to a depth of about three hundred feet by a main shaft, from the bottom of which drifts have been run nearly one hundred feet, disclosing in this level a heavy compact mass of vein matter. A well appointed twenty-stamp mill has been running on the ores, which, during the past three years, have varied in their yield from seven to forty-four dollars per ton. Connected with the mine is a tract of five hundred acres of partially timbered land.

One mile south of Jamestown, also situated on the great crowning vein of the county, and covering what seems to be one of its more enriched portions, is the Dutch mine, so called from the nationality of the former owners, and by whom it was sold to M. B. Silver, the present proprietor. On the surface it is composed of four parallel veins, all of which, from their proximity and angle of pitch, it is thought will finally unite in one masterly lode. The mine, though not extensively developed, has been sufficiently prospected to establish its permanency and great probable value ; the uniform yield of the ore, of which the quantity is very large, having been fifteen dollars to the ton, the gold being free and easily saved by the most simple and inexpensive methods. The ores have been worked for five years past with a ten-stamp mill ; a much larger establishment being required to render even a tithe of the productive capacities of this mine available.

The App mine, adjoining that last described on the south, and differing but little from it in its main features, has been worked for the past nine years with uniformly good results. During this time nine thousand tons of ore were crushed, yielding $140,000, or an average of $15 50 per ton—the cost of mining and milling having been about $67,000.

From the Golden Rule mine, lying a few miles south of the App claim, there were raised during the year 1866, three thousand tons of ore, which yielded $32,654, having been at the rate of $10 75 per ton. The quantity of ore taken out and reduced the following year, at the company's mill, was three thousand two hundred and forty-four tons, which yielded $38,868—nearly $12 per ton—the cost of mining and milling having been less than $7 per ton. Five dividends were made during 1867, of $1,450 each, the company having, in January, 1868, a surplus in bank of $11,000, to be applied to construction account.

Tuolumne has within its limits six main trunk water ditches, varying in length from seven to one hundred miles. Several of these are works of magnitude, and required the expenditure of large sums of money in their construction. The Big Oak Flat canal, forty miles long, cost over $600,000 ; the ditch of the Tuolumne County Water company, but thirty-five miles long, having cost $550,000. The distributing branches of these canals have an aggregate length far exceeding that of the mains themselves, and also called for heavy expenditures in their construction.

Two miles north of Columbia are extensive beds of marble. It is of many varieties—some pure white, others blue, veined, clouded or pencilled: and all, where taken from a few feet beneath the surface, of a fine, close texture. Large quantities have been quarried and sent to market, having previously been sawed into slabs at a mill near by, erected for the purpose. Such is the compactness of the material, and the depth of the beds, that blocks of any desired size can be taken out—one weighing thirteen thousand pounds having been quarried and dressed.

Near Sonora there is a deposit of plumbago, from which it is thought a merchantable article of graphite may be obtained, at least in limited quantities, by carefully washing it to relieve it of its earthy impurities. Some of it is said to have already met with sale in markets abroad, being bought, most likely, for manufacturing crucibles, stove blacking, or similar purposes.

Recently a stratum of soap stone has been found near Sonora, said to be well adapted for the lining of smelting works. The deposit is abundant, and promises to be extensively worked—the trials of this material which have been made having proved satisfactory.

## MARIPOSA COUNTY.

This county received its name from an extensive Mexican grant, called "Las Mariposas," lying within its limits at the time of its creation, then claimed by, and since confirmed by the United States government to John C. Fremont. *Mariposa* is a Spanish word, signifying a butterfly in that language. This county is bounded by Tuolumne on the north, by Mono on the east, by Fresno on the south, and by Merced on the west. It measures sixty-five miles, east and west, and about twenty-eight north and south—the eastern part rising into the lofty Sierra, while the western sinks almost to a level with the San Joaquin plains. Covering some of the wildest and highest portions of the great snowy range, the scenery in the eastern section of the county is among the grandest in the State. Here stands Mount Dana, 13,227 feet high; Mount Hoffman, 10,872 feet high, and Cathedral Peak, 11,000 feet high. In this region the Merced, the San Joaquin, and the main fork of the Tuolumne river take their rise, the former running centrally through nearly the whole length of the county. The Chowchilla river, a small stream in summer, being at this season nearly dry, separates Mariposa from Fresno.

Throughout the mining districts, where most of the population is found, there are many good wagon roads, but none have been built leading over the Sierra—the only communication with Mono county being afforded by a trail leading through the Mono Pass, the lowest point on which is 10,765 feet high. This trail is much used by horsemen and pack trains in the summer, being impassable at other seasons on account of the snow.

The towns of Mariposa are neither large in size or number, many of them having during the past ten years shrunken much from their former proportions, and mining camps, once busy and populous, are now nearly deserted. The number of inhabitants in the county, once nine or ten thousand, does not at present much exceed half that number. The population of the principal towns may be set down at about the following figures: Mariposa, the county seat, 800; Hornitos, twenty miles to the northwest, 700; Coulterville, twenty-one miles north of the county seat, 500; and Bear Valley, twelve miles northwest, 400. Princeton, Mount Bullion, Indian Gulch, Mount Ophir, Agua Frio, Colorado, and Mormon Bar, are mining hamlets containing from fifty to three hundred inhabitants each, some of these places having fallen into almost hopeless decay through the utter exhaustion of the once rich placers and the absence of quartz lodes in their vicinity; while others, through the rejuvenating influence of quartz mining operations prosecuted in their neighborhood, are slowly increasing in business and population; and there is much to warrant the belief that many of these villages will experience a rapid growth, and others be founded along the heavy quartz zone that crosses the county, at a period not distant in the future.

All the eastern end of this county is heavily timbered with the several varieties of pine, spruce, and cedar found further north; the lower half being more sparsely wooded, the extreme western section almost without trees of any kind whatever. The county contains eight saw mills, all of limited capacity, the quantity of lumber required for home use being small, and none being made for transportation abroad.

Mariposa contains but comparatively little good farming land, though there is a considerable scope of alluvial soil along the streams in the edge of the foothills, and many small fertile valleys further in the interior, which afford, under a careful system of cultivation, all the fruits, vegetables, and dairy products required by the inhabitants, there being also a good deal of barley, wheat, and oats raised every year. Of the twenty-five thousand acres of land enclosed in the year 1867, about eight thousand were subjected to tillage, the yield of the cereals being fully up to the average throughout the State. As yet there has been no flour mill erected in this county, the mills in Merced, adjoining, being sufficiently near to accommodate the farmers of Mariposa. There is but little stock kept here, and, although fruits of all kinds thrive wherever planted, only enough is raised to serve local wants.

The substantial wealth of Mariposa rests in its mines of auriferous quartz, which are hardly second in point of number and productive capacity to those of any other county in the State. Its placers even, at first of but moderate extent, and belonging to the class denominated "spotted," speaking in miner's parlance, were, perhaps, in places, among the most prolific ever found. Being rich, shallow, and hence easily wrought, they naturally attracted that class, who, prone to take desperate chances, are apt to exhibit more or less of the desperado in their every day conduct; wherefore the character of the early inhabitants of this region conformed strongly to that remarked upon when speaking of the pioneer settlers of Tuolumne county. Theft, murder, and general lawlessness and crime, during the early day, here reigned supreme. But the social atmosphere has become purged of these elements of violence—death, penal law, and emigration to more genial localities having long since wrought their effectual work, Mariposa is now scarcely behind her neighbors in the matter of moral purity and good order.

Owing to the speedy depletion of the shallow placers and the lack of extensive bank diggings and gravel beds, but little hydraulic washing or tunneling has been practiced in this county; and, as a consequence, but few canals or water ditches, the necessary auxiliaries to this branch of mining, have been constructed. The entire length of these works does not cover a linear extent of over forty miles—the total amount of money expended upon them in the county having been less than $30,000. It is the opinion of very competent judges that there are heavy banks of auriferous detritus, as well as gravel deposits, in Mariposa, and that large and profitable workings might be afforded by these were water for washing once introduced. Acting on this belief, primary steps have been taken for the purpose of conducting this element, of which there is an abundance, easily obtainable, into some of the more promising placer districts.

Striking across the western extremity of this county, maintaining its usual north-northwesterly and south-southeasterly bearings, the *Veta Madre* of the great auriferous range of the State displays itself with great power. On the Fremont grant, consisting of forty-eight thousand acres, this lode is separated into two strong veins, known as the Pine Tree and Josephine, which at points along the range unite and form the crowning lode of the country.

The following exhibit of the yield obtained by a number of companies engaged in raising and milling ores from this vein, being general in its character, and spread over a considerable period, may, perhaps, be accepted as safe data in calculating the results that would be likely to attend the working of claims situated elsewhere on this lode: The Mariposa Company own four mills of the following capacity, viz: the Benton, sixty-four stamps; the Mariposa, fifty stamps; the Princeton, twenty-eight stamps, and the Bear Valley, ten stamps. They are all well appointed establishments, the first driven by water and the others by steam. They are situated near the mines of the company, which consist of the Josephine, Pine Tree, Mount Ophir, Mariposa, and Princeton, all on the mother lode, and capable of supplying, under present developments, two hundred tons of ore daily; though the quantity might easily be increased to three or four thousand, such is the body of pay matter carried by these veins.

Under former management, running through several years, during which the ores from the Josephine and Pine Tree lodes were extensively worked, the gross average yield obtained was but about eight and a half dollars per ton, a sum—as labor and material were then rather more costly than at present, that left but small margin for profit. Since this property passed into other hands, a new mode of amalgamation, known as the "Eureka process," having been adopted at the Bear Valley mill, the following results were obtained; eight hundred tons of ore from the Josephine mine, which before had proved of a somewhat lower grade than that from the Pine Tree, worked by the new method prior to September, 1867, gave an average yield of $40 53; the average yield of one thousand tons for the following three months having been $30 per ton—a rate, which it is thought, can hereafter be steadily kept up. The company have since made arrangements for introducing this process into their other mills.

The Crown Lead company, owning no less than fourteen thousand four hundred and fifty linear feet, all upon the main gold bearing belt, and extremely well situated for easy development, have erected, at an expense of $50,000, a twenty-stamp mill and dam, their works being on the Merced river, near which also their mine is located. Prior to their coming into possession of this property, appurtenant to which is a tract of six hundred acres of timber land, large sums were expended for the purpose of prospecting the mine, the erection of a mill, etc. The most of this work, however, having been injudiciously applied and the mill having been swept away by a flood, the former owners accomplished but little either in the way of developing their mine or working its ores. Enough, however, has since been effected to establish for this property a very high value, though active operations have for some time been suspended upon it.

The Oakes and Reese mine, owned by Messrs. L. L. Robinson and Hall McAllister, of San Francisco, and lying on the same belt with the claims of the Mariposa Company, is another of those mines, which, after years of failure or but partial success, have, under a better administration or in the hands of men of more ample means, been speedily converted into highly productive properties. The lode now being worked, one of eight owned by the proprietors, is from two to six feet thick, has been thoroughly developed and powerful hoisting works have been erected, and a ten-stamp mill, with driving power for a much larger number, has been put up; the total expenditure, exclusive of purchase money for the mine, having been $110,000. The ore, of which there is a heavy body, has thus far ranged from $20 to $40 per ton, the bullion product for the month of January, 1868, having been $32,500.

Situated near the southeasterly line of the county, on the Merced river, is the valley of the Yosemite, with its stupendous surroundings. Here, within a space less than twenty miles long and ten miles wide, are presented more picturesque, grand and beautiful scenery—more striking and original views than are perhaps to be found within any similar area in the world. If travelers may be credited, within no other compass so narrow on the face of the globe, have so many high and steep precipices, such lofty cascades and awful chasms, such deep and beautiful valleys overlooked by so many towering domes, high bastions and splintered spires, all of bold and glistening granite, been grouped together as in and around this valley of the Yosemite. The name is of Indian origin, and should be pronounced with four syllables, accenting the second.

Geographically, this spot is said to be very near the middle of the State, measured north and south, and exactly in the center of the Sierra Nevada, it being thirty-five miles to either base. It is one hundred and forty miles, in a direct line, a little south of east from San Francisco; the distance by the usually traveled route, via Stockton and Coulterville, or Mariposa, being about two hundred and fifty miles. The valley proper, which has an elevation of four thousand and sixty feet above the level of the sea, is eight miles long and from half a mile to one mile wide; the greatest breadth being near its middle, where it is three miles across, and whence it tapers gradually towards each end. It is so nearly level that the Merced river, running through it, moves with a gentle current, expanding at several points into little lakes, the water so perfectly pure that it reflects the surrounding peaks and cliffs with wonderful distinctness. This river, at all seasons a considerable stream, is greatly swollen in the latter part of the spring and the early summer, when the snow on the mountains above is melting, which is, therefore, the most favorable season for visiting the valley, as the several falls, one of its chief attractions, are then displayed to best advantage.

Entering the valley at its lower or westerly end by a descent of two thousand feet down a steep mountain trail, its course for the first six miles is northeast, when it makes a sharp angle, and runs nearly southeast. At its lower extremity, the flat land ceasing, all semblance of a valley is lost in a cañon, so deep and precipitously walled that it may be pronounced inaccessible. Proceeding up the valley, hemmed in by walls of yellowish granite, from two thousand to four thousand feet high, the first conspicuous object met with is the "Pohono"—by some called the Bridal Veil Fall, on the right hand side, with the Cathedral Rock, about three thousand feet high, standing behind it. On the other side of the valley is the Tutucanula, or "El Capitan" cliff, an almost perpendicular, bastion-like mass, lifting itself three thousand three hundred feet above the level of the valley. Proceeding onward, a little above the "Pohono" Fall, the Cathedral Rock, backed by the Cathedral Spires—two slender columns of granite—is passed, and we arrive, two miles above, at a group of peaks standing on the other side of the valley, to which the name "Three Brothers" has been given. From the loftiest of these—four thousand feet high—more than eight thousand feet above the level of the sea, is to be obtained one of the best views of the valley and its immediate surroundings, including also the towering summits of the Sierra, in the background.

Standing over against this group, and near the angle where the valley, turning, trends to the southeast, is a cluster of prominent cliffs, the top of the highest three thousand feet above its base, and which, from its having the form of a regular obelisk for more than a thousand feet down, has been named "Sentinel Rock." Three quarters of a mile southeast of the Sentinel, stands the Dome, four thousand one hundred and fifty feet high—its horizontal section nearly circular, and its slope regular all round.

Directly across the valley from Sentinel Rock is the Yosemite Fall, where a stream of the same name, twenty feet wide and two deep at high water, precipitates itself over the cliff, falling at one bound a vertical distance of one thousand five hundred feet, after which it makes, by a series of cascades, a further descent of six hundred and twenty-six feet in the course of the third of a mile, when with a final bound of four hundred feet, it leaps to the bottom of the valley—making in this short distance a total descent of two thousand five hundred and twenty-six feet—some calculations making it even a little more. Having, however, in this instance, as in all other cases pertaining to heights and distances in and around this valley, adopted the figures of the State Geological Survey, the measurements given may safely be accepted as being, if not absolutely correct, at least more nearly so than any others extant.

Two miles above this fall the main valley of the Yosemite ends, running into three deep gorges ; the central, through which flows the Merced river, running nearly east and west, and the Tenaya fork bearing to the north, while the valley of the Illilouette, through which also flows a considerable stream, ascends in a southerly direction.

Following up the Tenaya cañon to a point a little above its mouth, we have on the right, in full view, what has been for a long time partially in sight, the most grand and impressive object in or around the valley. This consists of a fearful cliff, four thousand seven hundred and thirty-seven feet high, named the Half Dome—from the fact that one face is rounded in form while the other is perfectly vertical, giving the impression that one half of what was once a regular dome-shaped mountain has been broken off and engulphed; which is no doubt really the case, though there are no fragments on the surface at the base, nor other ruins left to show what has become of this lost portion. Without any compeer in mountain topography elsewhere, it stands isolated and vast, a striking monument to some strange dynamic movement, all other traces of which have been forever covered up.

On the opposite side of Tenaya valley stands the North Dome, another rounded structure of granite, its summit elevated three thousand five hundred and sixty-eight feet above its base. Flanking one side of it is a vast buttress, called the Washington Column; and in the sides of the cliff adjacent is a series of vaulted chambers, formed by the sliding down of immense fragments of rock from above, named the Royal Arches. Further up the cañon, reposing under the awful shadow of the Half Dome, is a little lake called Tissayac, which, like all the waters here, is ever cold and as pellucid as crystal.

Along the middle, or Merced cañon, are several remarkable cataracts, as well as many lofty cliffs and peaks, some of the latter hardly inferior in the majesty of their proportions to the Half Dome itself—

though less unique and impending. The two most noteworthy falls on this stream, rendered exceedingly grand when the river is at high stages, are the Vernal, or Puiyac, the lowest down, and the Nevada—the former having a perpendicular height of four hundred and seventy-five feet, and the latter of six hundred and thirty-nine feet, the river making a total descent of more than two thousand feet in a distance of two miles.

There are also many grand cataracts and cascades on the Illilouette, or South Fork, along which the scenery partakes largely of the same bold character with that already described, though this branch has been less explored than the main valley, or either of the others.

Scattered over the principal valley, as well as the lower slopes of the mountains are groves of pine, mixed with which, in the valley, are several species of oak, with some willow and poplar—the latter of the kind usually called cottonwood—being what in the East is known as the "Balm of Gilead." These forests, abounding with grassy glades and lakes, and being filled in summer with a variety of wild flowers, the whole valley approximates nearer a scene of enchantment than anything else to be found in nature.

The climate here in the winter is rigorous, the valley at this season being almost completely shut out from the sun, and the snow falling so deep on the trails leading into it as to render it difficult of access before the middle of May. In the summer the atmosphere is kept cool by the lakes and running water, and the spray from the falls—the sun, even at this season, never shining on many parts of the valley.

Near Crane's Flat, thirty miles southeast of the town of Mariposa, occurs another grove of Mammoth Trees, similar to that in Calaveras county. This group contains four hundred and twenty-seven trees, varying in size from twenty to thirty-four feet in diameter, and from two hundred and seventy-five to three hundred and twenty-five feet in height. This grove, which has an altitude of nearly six thousand feet above the level of the sea, is scattered over an area of about five hundred acres. The remains of a prostrate tree, now nearly consumed by fire, indicate that it must have attained a diameter of about forty, and a height of four hundred feet. Near this large grove are two others, the one containing eighty-six and the other thirty-five trees, the average size of which are about the same as of those in the principal grove.

## MONO COUNTY.

This county derives its name from a large lake situated in its northern part—the word being of Indian origin. It lies wholly beyond the main ridge of the Sierra Nevada, the crest of that range forming its southwestern border. It is long and narrow, extending northwest and southeast one hundred and fifty miles, and having an average breadth of about forty miles. Its easterly portion is traversed longitudinally by the White, the Inyo, and several other chains of mountains; its western section rising to the summit of the Sierra, and covering, in part, Mount Dana and Castle Peak—the former thirteen thousand two hundred and twenty-seven, and the latter thirteen thousand feet high. The east and the west fork of Walker river, having their sources in the great snowy range in the northwestern end of the county, after gathering many tributaries, flow north into the State of Nevada. Owen's river, heading a little south of Mono lake, and receiving the drainage of the Sierra on the west, and of the White mountains on the east, runs south and empties into Owen's lake, in Inyo county. There are no other streams of any magnitude in the county, though numerous creeks descend from the Sierra and after running a short distance out upon the sage plain at its base disappear in the barren and arid soil. At the point where these creeks debouch upon the plains fertile deltas have been formed—their waters spreading out over a considerable space of ground; this system of natural irrigation having been promoted by the Indians, who, finding here their favorite places of abode, have employed it extensively in watering the wild clover; which, thus aided, grows abundantly, and upon which they love to feed when it is young and tender. About the headwaters, and along the two forks of Walker river, as well as in the valley of Owen's river, there are large patches of alluvial soil upon which, through the assistance of irrigation, good crops of grain and the more hardy vegetables can be raised; though the country is too elevated for the successful culture of most kinds of fruits—its general altitude being about six thousand feet. As a consequence, while much stock is kept here in the summer—enough butter and cheese being made for the consumption of the inhabitants—very little is done in the line of general farming; the amount of land inclosed in 1867 having been only about six thousand acres, of which less than one third was under cultivation. Barley is the principal grain planted, though a few thousand bushels of wheat and oats are raised every year.

But trifling expenditures have been made on account of wagon road construction within the limits of the county—the nature of the surface, consisting largely of open valleys in the more populous sections, rendering costly improvements of this kind by no means imperative. Wagon communication with California is had mostly by way of Carson valley; though lightly loaded vehicles cross the mountains during the summer by the Sonora road, which terminates at Bridgeport. At this season horsemen and pack trains also cross on the Mono trail, coming in further south.

There are no towns of any magnitude in this county—Bridgeport, the county seat, and the largest, having but about two hundred inhabitants. Beyond this, there is nothing but mining camps, containing, at most, not over thirty or forty persons each. Monoville, once having more than a thousand inhabitants, is now not only deserted, but has almost entirely disappeared—such buildings as have not been removed elsewhere, being nearly all crushed into shapeless ruins by the weight of the snow, which here falls to a great depth in the winter.

On the Sierra there is much spruce and pine timber, from which enough lumber of a fair quality is made to meet local requirements. There are eight steam saw mills in the county, with a joint capacity to cut forty thousand feet of lumber daily—the whole erected at an aggregate cost of $70,000. The piñon grows, after its usual scattered and straggling manner, on many of the hills and mountain ranges in the northern and eastern parts of the county; the only trees found on the plains, or in the extensive valley of Owen's river, consisting of a few willows, growing along the banks of that stream.

The Mono canal, twenty miles long, built to carry water from Virginia creek to Monoville, is the only work of the kind in the county—though there are many small ditches in the farming districts dug for irrigating purposes. This canal, constructed nearly ten years ago, at a cost of $75,000, was designed to supply water for working the diggings at Monoville, which for a few years paid a population of six or eight hundred very fair wages. These placers, originally of but limited extent, becoming exhausted, the locality has since been nearly abandoned—very little work having been done there for the past seven years.

At no other point in the county have any surface diggings worth mentioning been found, though very considerable operations in vein mining have been carried on at various places within its limits. In the Bodie district, a few miles north of Mono lake, many heavy quartz veins, carrying both gold and silver, were located in 1860, upon several of which much work has since been performed. Two large quartz mills have, within the past two years, been erected in the district; but owing to difficulties experienced in treating the ores, or other causes, they have been idle much of the time since.

Several districts have been laid out elsewhere in the county, the more important of which, either because of the work done in them, or the superior character of their mines, consist of the Montgomery, Hot Spring, Blind Spring, and Castle Peak. In the three first named, several small mills and smelting works have been put up—the ores, though generally very rich being obdurate, and requiring treatment by fusion. Lack of capital, and the many other drawbacks against which these mines have had to contend—difficult of access, and often suffering from inadequate supplies of wood and water—have prevented any extensive developments from being made upon them. With these wants supplied, and these obstacles even partially removed, they could, no doubt, be worked with profit—a few claims, operated with very incomplete appliances, having been made to yield handsomely, on a small scale. That a portion, at least, of the ores here obtained are of high grade, is established by the fact that many tons sent to San Francisco for a market have sold at rates that left a good profit margin, after paying the cost of extraction and the great expense of freight. Until greater facilities for transportation are afforded, however, the bulk of these ores must be reduced on the ground—a disposition that can be economically made of them wherever wood and water are plentiful, and when suitable works shall be erected for treating them.

In the Castle Peak district, situated on an outlying bench of the Sierra, a few miles south of Bridgeport, an immense silver-bearing lode, called the Dunderberg, was discovered in 1866. Many claims were afterwards located on this mother lode, which crops out boldly for a distance of several miles. Upon the original location a large amount of exploratory labor has been performed, and there is a strong probability that it will ultimately develope into a valuable mine.

Mono contains five quartz mills and reduction works, the whole carrying thirty-eight stamps, and erected at a cost of about $230,000. There are within its limits several groups of hot springs, none of them, however, possessed of such striking features as to entitle them to especial notice.

Save, perhaps, some of the higher mountain peaks in its western part, already alluded to, this county possesses no topographical or other natural feature sufficiently notable to call for extended comment, except Mono lake—a body of water fourteen miles long, from east to west, and nine miles wide, occupying a basin on the divide that separates the waters of Walker river from those flowing into Owen's lake. The size of this lake was formerly much greater than at present, as is indicated by the numerous lofty terraces, distinctly seen nearly all round it—they being most strongly marked on the west shore, where the highest has an elevation of six hundred and eighty feet above its present surface.

This lake contains a number of islands, one of which is two and a half miles long, and another half a mile in length. They are all composed of volcanic matter, the basin of the lake itself being supposed, from its great depth and peculiar formation, to occupy the crater of an ancient volcano. There are now scattered about in the vicinity numerous cones and partial craters pointing to a period when there were many volcanoes in action here. In fact, upon the larger of these islands, there are now hundreds of fumorolas from which gas, steam, and smoke are constantly escaping, showing that these volcanic agencies have not yet become wholly extinguished.

The water of the lake, intensely bitter and saline, is of high specific gravity, being supersaturated with various mineral substances, of which salt, lime, borax and the carbonate of soda form the principal. So large a percentage of the latter does it hold in solution that it washes better than the strongest soap-suds; in fact, such is its corrosive power, that it is impossible to remain in it for more than a few moments, when bathing, without the skin becoming painfully affected. No living thing, except the larva of a small fly, inhabits this lake; even the wild fowl that frequent it in summer keeping near the inlets where the acrid water, diluted by the mountain streams discharging into it at these places, is robbed of its more pungent properties.

So abundant, however, is the product of this insect, which taking the shape of a small, white worm, drifts in millions upon the shore, that the Indians, who collect and dry it, find in it one of their most acceptable staples of subsistance. So sluggish are the waters, which have an oily appearance, that none but the strongest winds suffice to more than raise a ripple on their surface. Void of life, and surrounded with desolation, Mono has aptly been termed the "Dead sea" of the Great Basin; being, though of less extent, much deeper, and more of a waste in its dreary surroundings than the Great Salt Lake of Utah; if not, also more bitter and baneful than the sullen waters that roll over the lost cities of the Plains.

## INYO COUNTY.

This county, organized in 1866 from portions of Tulare and San Bernardino counties, is named after a mining district and a mountain range lying within its borders, the term being of Indian origin. Inyo is bounded on the north by Mono, on the northeast by the State of Nevada, on the southeast by San Bernardino, and on the west by Tulare county, its form approximating that of a triangle. Like Mono, it lies wholly east of the main ridge of the Sierra, the crest of that range, which here reaches its greatest altitude, forming its western border. The Inyo mountains, running north and south, traverse the county centrally; the Panamint, a parallel and still higher range, lying to the east of it; while a portion of the Armagosa group occupies the extreme eastern angle of the county. These mountains contain, standing in patches or scattered over them, a sparse growth of piñon and juniper trees, though they are but poorly supplied with either grass or water, and have little or no land fit for tillage except narrow strips of alluvium bottoms along a few of the streams at the point where they debouch upon the plains. Neither are there any tracts of farming or meadow lands in the valleys lying between these ranges, with the exception of that of Owen's river, along which there is a strip of rich soil varying in width from a few rods to a mile or more; and which, with irrigation, produces grains and vegetables of all kinds in the greatest profusion. In several of the valleys there are extensive alkali flats, and sometimes beds of salt—saline and hot springs being also occasionally met with. The running water is generally fresh and pure, that of the lakes and ponds, as well as many of the springs, being so impregnated with salt and chloride of soda as to be not only unpalatable, but wholly unfit for drinking or culinary purposes. The waters of Owen's lake, twenty-two miles long and eight wide, as well as those of the Little lake, a pond lying twenty miles further south, are all of this description.

The amount of land enclosed in 1867 being mostly in Owen's river valley, was estimated at two thousand acres, about one half of which was under cultivation, the rest being mown for hay. The principal grain raised was barley, though wheat and oats thrive equally well, and Indian corn is also successfully cultivated. A grist mill having recently been erected in Owen's valley, more wheat will, no doubt, be planted hereafter, as facilities will be at hand for converting it into flour.

There are three saw mills in the county, all of limited cost and capacity, the demand for lumber heretofore having not been large. No wagon roads have yet been built except a few of brief length leading from Owen's valley into the mines. Throughout the entire length of this valley, reaching for more than one hundred and fifty miles, good natural roads exist.

Inyo contains but few towns, or even populous mining camps; Independence, the county seat and largest village in it, counting but about one hundred inhabitants, exclusive of a small garrison of soldiers stationed at this place. The entire population does not at present exceed one thousand, though there is a strong probability that the number of inhabitants will soon be materially augmented through the very attractive character of the mines within its borders.

Running in from the south, between the Armagosa and Panamint mountains, before mentioned, is the desolate region of "Death valley," which having a length of forty miles, with a width of eight or ten, runs north twenty degrees west from the point where the Armagosa river sinks at its southern extremity. According to observations made by a party of the United States Boundary Expedition, who entered it in 1861, the whole of this plain is sunk four hundred feet below sea level, giving it a greater depression than the Caspian sea, and nearly as great as that of the Dead sea, the sink of the Jordan, in Palestine. It is probably the bed of a former lake, the waters of which were heavily charged with salt and soda, a large portion of this basin being covered with an incrustation of these minerals several inches thick. The remainder of this surface is composed of an ash-like earth, mixed with a tenacious clay, sand and alkali, and is so soft that a man cannot travel over it in the winter without difficulty, it being impossible for animals at any season to cross it. In spots, where there is less moisture, the surface is so porous that a horse sinks into it half way to the knees, rendering travel slow and laborious. Water can be obtained almost anywhere by digging down a few feet, but it is so saline and bitter that it can be used by neither man nor beast. With the exception of a few clumps of worthless shrubs near its borders, this plain is destitute of even the slightest traces of vegetation; nor are any signs of animal life to be seen upon it except a small black gnat, which, swarming in myriads during the summer, greatly annoy the traveler, entering his eyes, ears and nose, their attacks being persistent and their sting peculiarly irritating.

The valley is encircled by a barren sage plain, from three to six miles wide, which, beginning at the base of the mountains that surround it on every side but the south, slopes gently down to its margin. Coursing across this sterile belt, on which nothing grows but the wild sage, intermixed with a few tufts of bunch-grass, are numerous ravines, the most of them dry, except, perhaps, at long intervals; the streams that flow through their upper portions, at the season of the melting snows, sinking into the dry and porous earth soon after they reach the foot of the mountains. Along these water-courses grow a few willow and mesquite trees—the latter, though low and bushy, having a firm fiber, makes excellent fuel.

At a point about thirty miles north of Death valley, the Armagosa river, a stream of small volume but great length, takes its rise, and flowing southeast for more than a hundred miles, makes a detour when far out on the Mohave desert, and bending round to the northwest, runs in that direction about forty miles, when, having reached the southern end of this arid plain, it finally disappears. A considerable stream flows also into the north end of the valley, but, like the Armagosa, as well as all the springs and such streams as do not descend immediately from the mountains, the water is so impregnated with salt as to be unfit for drinking.

The heat of this basin, uncomfortable often in winter, is constant and terrible throughout the entire summer, the thermometer ranging from a hundred and ten to a hundred and forty degrees during the day. From the absence of animal life, and the sluggish state of the atmosphere, an ominous stillness reigns perpetually over it, giving, in conjunction with the terrific heat and aridity, fearful significance to the name popularly applied to it. In the summer of 1849 a party of immigrants, making their way overland to California, strayed into this valley, and having wandered through its entire length, sought to escape by scaling the mountain range that shuts it in on the north. Being unable, however, to find any fresh water, several of the party, together with most of their animals, perished from heat and thirst, they having become nearly exhausted before reaching the point where they at length gave out. The evidences of their sufferings and final disaster are still to be seen at several points along their route. Scattered about one of their camping grounds are numerous remains of wagons, kettles, and other cooking utensils, indicating a purpose of relieving themselves from all useless equipage. Some miles further on, where they had become entangled among the sand hills and soft bottoms along Salt creek, is what seems to have been the culminating scene of their sufferings. Here the bones of animals and the fragments of wagons, camp furniture, etc., are thickly strewn around ; and here, no doubt, covered by the drifting sands, are the solitary and unmarked graves of those who died.

Not far from this spot, and somewhere on the eastern slope of the Panamint mountains, is the locality of the rich silver deposit supposed to have been found by the survivors of this unfortunate party, while seeking for a practicable pass through that range, and which has since come to be known as the "Gun Sight" mine, from the fact that one of the discoverers, according to tradition, fitted a new sight for his rifle from the metalic silver obtained from the lode. Unfortunately for the credit of this story, as well as for numerous adventurers who have since gone in search of this famous deposit, it appears to have had nothing more substantial to justify it than the existence at that point of a micaceous talc, which, persons unacquainted with the appearance of silver ores, might, on hasty inspection, mistake for that metal.

Near the main deflection of the Armagosa, on the Mohave desert, a rich vein of auriferous quartz does exist; but there being no wood or fresh water, and scarcely any vegetation within a distance of fifty miles, and the whole country adjacent being covered with sand, glistening masses of basalt, and black volcanic buttes, it has been found impossible to work this mine with profit, though several attempts have been made to do so.

There is, however, in the western part of this county, situated in both the Sierra Nevada and the Inyo mountains, a great extent of valuable mines; certain sections of the Panamint chain also giving satisfactory evidence of mineral wealth. In the Kearsarge district, located high up against the eastern slope of the Sierra, a very powerful silver bearing lode was discovered in 1866, for which subsequent developments indicate both permanence and richness; considerable quantities of ore taken from the Kearsarge company's claim having yielded, by mill process, from three hundred to six hundred dollars per ton. The remoteness of the locality, however, and the stubborn nature of the ores, have thus far restricted milling operations to narrow limits. But the mine itself having in the meantime been fully proven, ultimate success only awaits more ample and efficient means of reduction. Three mills, one of twenty, and two of five stamps each, have been erected in this district; the larger driven by steam, and the two smaller by water, of which there is sufficient in the vicinity of the mines for propelling a large amount of machinery. There is also plenty of timber in the district to insure cheap supplies of fuel and lumber for an indefinite period. These mines being favorably situated for deep drainage and ore extraction, can be worked at comparatively small cost for many years to come.

In the Cerro Gordo, often called the Lone Pine district, lying along the western base of the Inyo mountains, there are a vast number of gold and silver bearing lodes, not generally of large size, and sometimes much broken up on the surface, but nearly all of great richness. The metals are chiefly a combination of silver, lead, copper, and antimony, a union rendering reduction by smelting necessary. The district has a length of about fifty miles with an average width of six miles, there being within its limits about five hundred miners, the most of them Mexicans. On the foot-hills and mountains adjacent to the mines are scattered groves of piñon and juniper, but many parts of the district are badly off for water, supplies being scanty in the dry season and obtainable only by digging. A large number of rude and cheaply constructed furnaces have been built for smelting the ores, which by this treatment yield, with a little selection, from one hundred to three hundred dollars to the ton. There are also a number of arastras in the district, some of the ores containing free gold and yielding liberally under this mode of working. With the aid of even a moderate amount of capital, very little of which has ever yet been invested in these mines, their product of bullion, it is believed by those most conversant with their character, could be multiplied many fold, rendering their more extended working largely and almost certainly remunerative.

Between the years 1861 and 1865, a number of mining districts were organized in different parts of this county, in some of which a good deal of prospecting work was done and several mills were put up. Owing, however, to the rebellious disposition of the ores, the occurence of Indian hostilities and other obstacles, incident to the then condition of this region or inherent in the mines themselves, no satisfactory results waited upon any of these enterprises. Under the more favorable circumstances now existing, some of these efforts are about to be resumed—a marked degree of success being confidently anticipated.

There are now fourteen quartz mills in this county, several of them costly and of considerable capacity, and all driven by steam except four. They carry a total number of one hundred and thirty stamps, and cost in the aggregate about $350,000. There is but a single water ditch in the county of any magnitude, the San Carlos canal taking water from Owen's river, and conducting it along its banks for milling and irrigating purposes. It extends a distance of fifteen miles, and cost about thirty thousand dollars.

## VALLEY COUNTIES.

### TEHAMA COUNTY.

Tehama county, erected in 1856, has the following boundaries, viz.: Shasta on the north, Plumas and Butte on the east, Butte and Colusa on the south, and Mendocino and Trinity on the west. Its length, east and west, is about seventy-eight miles, and its average breadth thirty-eight miles, giving it a superficial area of nearly three thousand square miles. The county is bordered on the west by the Coast Range of mountains—its eastern portion being covered by numerous outlying spurs of the Sierra Nevada. The latter are well timbered with forests of spruce and pine, suitable for making lumber. The Coast Range contains only an inferior species of oak and pine, while there is but little timber of any kind elsewhere in the county—the cottonwood and sycamore formerly growing along the Sacramento and other streams, being now nearly all cut away.

Tehama is almost exclusively a farming and stock raising county—there being a large body of rich alluvial soil in the valley of the Sacramento river, running centrally across it, and along the several large creeks that flow from the mountains on either hand. Here is a broad scope of the best grain growing land in the State, while the hills are everywhere covered with wild oats and bunch grass, affording rich and ample pasturage for the herds of sheep, horses and cattle that constantly feed upon them. The numerous streams afford abundant means for irrigation—an aid not often needed for maturing the cereal crops, though employed to some extent in the gardens, orchards and vineyards.

In 1865, there were, according to the Assessor's report, 70,715 acres of land enclosed in this county, of which about 16,000 were under cultivation; 7,832 acres, sown to wheat, yielded 147,478 bushels; 8,068 acres, sown to barley, yielded 153,965 bushels; and 25 acres, planted to oats, produced 1,080 bushels. In the year 1866, 13,424 acres of wheat gave a product of 270,035 bushels—a less quantity of this grain having been raised the following season, though a greater area of land was sown; the crops having suffered, as was the case in many other localities in the State, from an excess of rain at one period, and an insufficiency at another. Several thousand bushels of Indian corn are raised here every season; a considerable amount of broom corn being also grown. The climate of this region is well suited to viniculture—there being now more than a half million grape vines in the county, and several thousand gallons of wine having been made annually for a number of years past.

Latterly, much attention has been given to sheep raising in Tehama, and as the soil and climate are well suited to this business, wool will, most likely, in the course of a few years, form one of its most important staples.

Tehama contains four grist mills, capable of grinding four hundred barrels of flour daily. They carry twelve run of stone, and cost, in the aggregate, about $90,000.

As there is little or no placer mining carried on in this county, no water ditches, other than those required for irrigation, have been constructed, while an almost exclusive devotion to agricultural pursuits has prevented the inhabitants engaging in the business of manufacturing—about the only thing done in this line being the making of flour and lumber. There are two saw mills in the county, both driven by water, and of but moderate capacity. The assessable value of the property in Tehama county was placed at $950,589 in 1865, and at $1,557,925 in 1867—showing a gratifying advance during this period.

Owing to the generally favorable character of the country, but few costly wagon roads have been required in this county, and, consequently, but little money has been expended on these improvements; the citizens, however, have contributed liberally towards building roads leading over the Sierra—the county having issued its bonds in the sum of $40,000 to aid the construction of the Red Bluff and Honey Lake turnpike, opening the shortest wagon route from the navigable waters of the Sacramento to northwestern Nevada and southern Idaho.

The population of Tehama numbers about seven thousand, of whom a large proportion are women and children. Red Bluff, the county seat, occupies a handsome site on the right bank of the Sacramento river, and contains two thousand five hundred inhabitants. It is a prosperous and growing town, and, being at the head of steamboat navigation on that river, enjoys a thrifty trade, not only with the different parts of the county, but also with points east of the Sierra—the amount of freight shipped from this place for the Humboldt and Owyhee mines being large, and increasing every year.

Tehama, twelve miles south of the county seat, on the same side of the river, has a population of about five hundred. Being near the point of confluence of several large creeks with the Sacramento, along each of which there is much fine land, it is the center of and supply point for an extensive farming district, extending in every direction around it.

Cottonwood, Moon's ranch, and Grove City are rural hamlets, containing from fifty to one hundred inhabitants each—there having been at one time several small mining camps in the county, the most of which are now abandoned.

In 1864, at which time there was much attention being paid to the discovery of copper, a great many lodes carrying the ores of this metal, often mixed with gold and silver, were located and partially prospected in the eastern part of the county. A town named Copper City sprang up at these mines, and a population of several hundred were for a time gathered there. A four-stamp mill was subsequently put up, the only one ever erected in the county, and ran for a period with fair success; the quartz, though somewhat difficult of reduction, having been found to yield from twenty to thirty dollars to the ton. Of late, but little has been done in the district—the population having mostly left—though it is believed the lodes are really valuable, and that they will yet be worked with profit—the facilities for extracting and reducing their contents being good.

In the northeastern part of the county are numerous volcanic cones, some of them regularly shaped and very steep; and rising several hundred feet above the country adjacent, they often become striking objects in the surrounding landscape.

All the streams heading in the Sierra run in deep cañons which open upon the Sacramento valley in gate-like chasms, the lava formation through which they flow terminating here with an abrupt edge. Below this is a barren, treeless belt, covered with volcanic fragments, which, gradually sloping to the west, merges in the fertile bottom lands along the river. The latter, in places, more especially along the water courses, still contain much timber, a great deal of that formerly found on these plains having been cut for fuel and fencing.

The Tuscan, formerly known as the Lick springs, lying to the northeast of Red Bluff, having quite a reputation for their medicinal virtues in certain cases, are much resorted to by invalids from the surrounding country—a bathing establishment and boarding house having been erected for their accommodation. The water has a temperature of about seventy-six degrees, and contains salt, soda, lime and borax, in various proportions.

### BUTTE COUNTY.

Butte county, so named from the Sutter Buttes, a group of prominent peaks lying a few miles south of its border, or perhaps from a low serrated mountain range within its limits, is bounded on the northwest by Tehama, on the northeast by Plumas, on the southeast by Yuba, on the south by Sutter, and on the west by Colusa county; its extreme length north and south being a little over sixty, and its average breadth about thirty-five miles. It is the only county in the State possessing an almost equal importance in an agricultural and mineral point of view. Skirted by the Sacramento river on the west, it embraces a large portion of the rich bottom lands along that stream; while, running through it from north to south, is the extensive and fertile valley of Feather river, with those of its several branches, giving it a large area of the finest farming lands in the State. Along the main Feather river, as well as on its South, its West and Middle Forks, and throughout the country lying between them, there is a broad scope of mineral land, forming the theatre of very active and remunerative mining operations.

The county is well watered—the western part by Rock, Chico, Butte, Mesilla and other smaller creeks, and the eastern by Feather river, its three main forks and their numerous tributaries; along all of which there is more or less rich interval land. The greater part of the county is level; only the eastern and northern sections rising into the foot-hills of the Sierra Nevada, while the northwestern is crossed by a number of low ridges, separating the several creeks that run through that region. The county along its northern and eastern border is well timbered; the interior and western part thereof being without forest suitable for lumber—much of it without a sufficiency of wood even for fuel. There are ten saw mills in Butte, each of which cuts barely enough lumber to meet the requirements of its own neighborhood, none being exported.

The citizens of this county, besides building many wagon roads for local conveniences, have aided in constructing others running into the more important mining districts, and one leading from Chico, on the Sacramento river, across the Sierra—a route by which much freight, destined for northern Nevada and the Owyhee mines, has gone forward during the past few years. Through the aid of a railroad extending from Oroville, near the center of the principal agricultural districts, to Marysville, the head of navigation on Feather river, and by means of the Sacramento river, also navigable, the farmers of Butte enjoy good facilities for shipping their produce to San Francisco, the controlling market.

The population of this county is estimated at about twelve thousand. The real and personal property therein, exclusive of mines, was assessed in 1866 at $5,128,358, giving an average of $427 to each inhabitant; and which, if the value of the mines were included, would make this, next to San Francisco and Nevada, the richest community in the State. In regard to the value of its real and personal property Butte ranks seventh in the list of California counties.

The quantity of land enclosed in 1865 amounted, according to assessor's estimates, to 293,222 acres, of which 74,775 were under cultivation. Of this, 19,975 acres produced 511,170 bushels of wheat, and 53,817 acres produced 698,227 bushels of barley. In the year 1866, 21,919 acres planted to wheat gave a yield of 231,041 bushels. The total product of this cereal in 1867, when a much greater breadth of land was planted than ever before, was estimated on good authority to have reached 800,000 bushels, very little other grain having been raised that year.

In 1867, General John Bidwell, the largest farmer in the county, had 2.000 acres sown to wheat, which gave a yield of 33,751 bushels—a much lower rate of increase than is usual in this county, the season having in some respects been unpropitious. The ordinary yield here averages about thirty bushels of wheat and forty-five of barley to the acre. General Bidwell has about 3,000 bearing fruit trees on his farm, from which he sent during the year last mentioned one hundred tons of green and fifteen tons of dried fruit to market. The value of the farming products shipped from Butte for a number of years past has amounted to $2,000,000 annually, it having some years exceeded these figures.

There are four grist mills in this county, the whole carrying ten run of stone, and capable of making about six hundred barrels of flour daily. They are kept almost constantly employed in grinding the home crop, large quantities of flour being sent into the neighboring mining districts and to points east of the Sierra. The Chico mill alone made during the year 1867 over five thousand barrels of flour, one or two of the others having ground nearly as much.

While grain raising has chiefly engrossed the attention of the agriculturalists of Butte, fruit growing and viniculture have not been wholly neglected; much wine being made and large quantities of fruit dried every season. For several years past enough raisins, of excellent quality, have also been made to supply the domestic trade.

The number of horses and mules kept for farm work and draft, and also of cattle, swine and sheep in this county, is large; wool being one of its staple exports. Difficulties in regard to land titles growing out of Mexican grants did much to retard the progress of farming here for many years, these troubles being now happily settled.

Among the products of this county, being novel in California, are peanuts, of which three thousand two hundred bushels were grown in the year 1867. They are cultivated by the Chinese, and are remarkable for their great size and excellent flavor.

In the year 1867 twenty thousand gallons of turpentine and two thousand five hundred cases of rosin were manufactured in Butte, from the sap or raw turpentine gathered by tapping the extensive pine forests that cover the eastern part of the county. The production of these articles could easily be increased many fold were they in larger consumption on this coast.

The principal towns in Butte are Oroville, the county seat, containing about fifteen hundred inhabitants; Chico, on the Chico Creek, with a population of fourteen hundred, and the center of a flourishing farming community, and which besides enjoying a large local trade, has a considerable commerce with the mining districts of Humboldt and Idaho; and Cherokee, an active mining town, ten miles north of the county seat, with about six hundred inhabitants in and around it. Bidwell's Bar, Brush Creek, Butte Valley, Forbestown, Inskip, Thompson's Flat, Hamilton, Wyandotte and Dayton are all mining camps, or agricultural hamlets, containing from one to four hundred inhabitants each.

As stated, a large proportion of this county consists of what may be termed mineral lands; every description of gold mines and mining being found and carried on within its limits, a broad expanse of placers having been wrought here at an early day. Here are innumerable lodes of gold bearing quartz; long stretches of *mesas*, or table mountains, covering the channels of ancient rivers; deep banks of auriferous detritus overlying the slates, and a great many shallow diggings, some of which, though very prolific, have been but little worked, the great drawback to placer mining in many parts of this county having been a lack of water; but few ditches of any magnitude having yet been built for introducing this element into the mines. These works are fifteen in number, varying in length from two to fourteen miles. Their entire length is sixty-eight miles; total cost, $75,000. With more copious supplies of water very extensive and profitable placer mining might here be prosecuted for many years. In many rich localities, however, an obstacle to successful operations exists in the extreme level character of the surface, there being too little fall to give the water sufficient motion for effectual washing, or to carry away the tailings. Owing to this difficulty a wide area of shallow placers near Brownsville can only be worked in a small way in the wet season, when good wages can be made operating with the rocker. The gold obtained in this vicinity is remarkable for its purity, ranging from 984 to 987 in fineness, and being, consequently, worth from $20.34 to $20.40 per ounce. This is said to be in point of purity the finest gold found in the State, and, with the exception of the dust coming from Africa, and from one or two small localities in Australia, the finest procured in the world.

Considerable river bed mining is carried on every summer in the channels of the main Feather river, and its several forks, where these operations have been attended with better average results than at any other point in the State. About Oroville, where, for a long time, river-bar and bank mining was conducted on a large scale ; at Cherokee Flat, Little Butte creek, Forbestown, and several minor localities, every branch of placer operations is engaged in, and generally with fair success, though not on a scale of such magnitude as in most of the mining counties lying further south and east.

Quartz mining during its earlier stages was attended with but indifferent results in this county. For several years past, however, this interest has been not only expanding, but making steady gains, until it has at length reached a stage rendering ultimate success no longer problematic. Cherokee, Wyandotte, Dogtown, Brown's Valley, Oregon City, Virginia, Yankee Hill, and Forbestown, are the points where quartz is being most extensively worked, and where the most of the mills are located. There are nine of these establishments in the county, carrying a total of one hundred and twenty-five stamps ; a forty stamp mill having recently been erected and set in operation at Forbestown.

Several years ago a stratum of coal, of the cannel variety, was discovered near Feather river. The tests made of it at the time were said to have been satisfactory, but the deposit has not since been sufficiently developed to determine either its probable extent or value as a fuel. A bed of marble has also been found on the same stream. The material, of which there is an abundance, being of close texture and variegated colors, will no doubt prove of future value.

## COLUSA COUNTY.

The name of this county is of Indian origin. It is one of the few regularly shaped counties in California, being nearly square, and has the following boundaries, viz: Tehama on the north, Butte and Sutter on the east, Yolo on the south, and Lake and Mendocino on the west. It has a length of fifty-seven miles north and south by a breadth of forty-five miles—the western part constituting about one third of the county, being covered by the Coast Range, is hilly or mountainous. The balance, consisting of rich alluvial, or less fertile prairie land, is nearly all level and well adapted to the growing of fruits and grain, this being almost exclusively an agricultural and stock raising county. The hills and mountains are covered with wild oats and a variety of grasses, affording rich and abundant pasturage. While the quantity of grain raised is considerable, a great deal of stock is also kept, much of it being bred for market, there now being over twenty-five thousand head of cattle in this county. Owing to the dryness and heat of the climate, dairying is not extensively carried on. Sheep and swine raising, however, form large and profitable branches of business. The wool clip of Colusa, for 1867, exceeded three hundred and fifty thousand pounds, the number of sheep being estimated at one hundred and twenty-five thousand.

Stretching for many miles along the Sycamore slough, and other streams running into the Sacramento river, are strips of tule land, amounting in the aggregate to about thirty thousand acres, the most of which could easily be reclaimed and converted into superior pasture, grain and meadow lands. The area of land enclosed in 1866 was estimated at about one hundred and thirty thousand acres, of which more than one third was under cultivation. The amount of wheat raised that year reached about two hundred and fifty thousand bushels, the crop of the succeeding year having been much larger. Considerable quantities of barley, oats and corn are also planted every season. A great quantity of additional land was taken up and sown to grain, mostly wheat, in 1867–8, which, should the season prove favorable, must largely increase the crop of the latter year. The number of acres of land under cultivation, in 1867, reached fifty-one thousand five hundred; of which, twenty-four thousand two hundred were sown to wheat, producing about four hundred and fifty thousand bushels, and twenty thousand one hundred and forty acres were sown to barley, producing four hundred thousand bushels.

The real and personal property of Colusa was assessed in 1866 at $2,080,830, a large proportion of it being on account of stock, all kinds of which thrive here with little care, the climate being mild and feed abundant. On the night of the 11th of January, 1868, snow fell at the town of Colusa to the depth of six inches, the heaviest fall that had occurred, with one exception, within the memory of the oldest settlers in the county. Only at long intervals does any snow ever fall in the valleys, its duration here being limited to a few hours. On the higher peaks of the Coast Range, which borders the county on the west, a little snow falls every winter; but it never reaches any great depth, nor does it lie for more than a few weeks at a time. Swine, of which there are large numbers raised in the county, grow and fatten on the tule roots, which, furnishing a cheap and nutritious food, enables the farmer to raise these animals with little expense and trouble. Often a thousand head of hogs, or more, are shipped from this county in a single week.

There are but few towns, and none of any magnitude, in this county —Colusa, the county seat, containing four or five hundred inhabitants, being the largest place in it. Princeton, eighteen miles, and Jacinto, forty miles north of Colusa, are small agricultural towns, and being, like the county seat, located on the Sacramento river, are points whence large quantities of produce are shipped every year. This county contains about four thousand five hundred inhabitants, there having been a marked increase in the population as well as in the value of property during the past two years.

There being no gold or silver mines in Colusa, it contains neither quartz mills nor extensive canals—the only water ditches being a few of small dimensions designed for irrigation. There are two steam flouring mills, carrying five run of stone, and two saw mills, the latter of small capacity, there being but little lumber made in the county. In fact, it contains no timber, with the exception of a limited amount in the Coast Range, suitable for this purpose. Many of the water courses were originally skirted by narrow belts of trees, consisting chiefly of sycamore and cottonwood; but these having been mostly cut away the settled parts of the county are but scantily supplied with fuel and fencing timber.

Deposits of sulphur, copper and cinnabar exist in the foot-hills of the Coast Range; but as the latter two have been but little worked, nothing positive can be affirmed in regard to their extent or value. The sulphur bed, in the same vicinity, about thirty miles westerly from Colusa, consists of large masses of native mineral, some of it quite pure, other portions being largely mixed with earthy matter. For the purpose of relieving it of these impurities, refining works have been erected on the spot, and considerable quantities of a good merchantable article produced. The limited demand, however, existing on this coast has caused a suspension of operations at this refinery; though such is the abundance of the raw material here, and the facility with which it can be gathered and refined, that with a home market even at moderate prices, these works could be profitably operated.

During the years 1864–65 a number of wells were bored in this section of the county in search of petroleum; none of them, however, met with any success, though several were sunk to a depth of two or three hundred feet. The incentive to these borings consisted in a number of petroleum springs located in the vicinity, the natural flow from some of which is copious and constant.

### SUTTER COUNTY.

This county is named in honor of General John A. Sutter, one of the earliest American settlers in California, and once one of the largest landholders of the State. This gentleman still continues to reside on Hock Farm, a small, but beautiful and highly cultivated tract of land on the west bank of Feather river, all that now remains to him of his once vast possessions.

This county is bounded by Butte on the north, by Yuba and Placer on the east, by Sacramento and Yolo on the south, and by Yolo and Colusa counties on the west. Though of small dimensions, being scarcely forty miles long, north and south, and but fifteen wide, it is among the most fertile, thoroughly cultivated, and, for its size, largely productive counties in the State. While grain planting forms the principal pursuit of the inhabitants, fruit growing, dairying, stock, sheep and swine raising, each comes in for a large share of attention, and is made to contribute materially towards swelling the wealth and adding to the annual exports of the county.

Sutter, forming a delta between the Sacramento and Feather rivers, is composed chiefly of the rich bottom lands lying adjacent to those streams; almost the only inequality of the surface, except a few low rolling prairies, that occurs within its limits, consisting of the Sutter Buttes, an isolated group of peaks, three in number, and joined at the base, standing in the northwestern part of the county. They form a conspicuous object in the landscape, the level character of the surrounding country rendering them visible for a long distance in every direction. Save the Sacramento and Feather rivers, there are no streams of any size in the county.

As Sutter grows no timber suitable for making good lumber, there is not a saw mill in it. A narrow strip of sycamore and cottonwood, along the two rivers mentioned, with a few scattered oaks elsewhere, constitutes about the only native growth of trees found within its limits. Neither have any mines or mineral deposits ever been found here; consequently Sutter is without quartz mills, canals or other hydraulic works.

The present population of the county is estimated at about six thousand, being, as in all purely agricultural communities, largely made up of families. There are but few towns, and none of large size; Yuba City, the county seat, containing not more than four or five hundred inhabitants, while Nicolaus, seventeen miles to the southeast, and the next in size, has not over three or four hundred. Vernon, Meridian, Rome, and West Butte, are hamlets, having from fifty to two hundred inhabitants each.

The real and personal property of this county in 1867 was assessed at $1,732,266. The amount of land under cultivation that year was estimated at sixty-five thousand acres; the quantity of wheat raised in 1866 approximating two hundred and seventy thousand bushels, being somewhat less than was raised the following year. A great deal of barley is also raised, with a small quantity of oats, Indian corn and other grain. Fruits and vineyards have been extensively cultivated, many trees and vines having been planted, and several thousand gallons of wine made every year. Oranges, olives, figs, pomegranates and almonds grow here with vigor and ripen in the open air. Over one hundred thousand pounds of butter is made annually; the swamp and tule lands, of which there is a broad belt running north and south through the county, affording green and succulent pasturage for the cows during the summer and greatly increasing their yield of milk.

The culture of the castor bean has received a good deal of attention in Sutter for several years past; over sixty acres having been planted in 1866, and a much larger number the ensuing year, the yield of which was exceedingly prolific.

## YUBA COUNTY.

Yuba is another of those interior counties, the industry of which, from their position along the line of contact of the alluvial valleys and the great mineral range of the State, has been largely diversified by a mixture of agricultural, pastoral, and mining pursuits. Lying partly in the rich and extensive valleys of Dry creek, Yuba, Bear, and Feather rivers, and partly on the foot-hills and lower slopes of the Sierra, cut by these streams and their affluents, it is composed almost entirely of choice farming, grazing and mining lands; more than one fourth of its area consisting of the latter. Besides its grain growing capacities, the abundance of the wild oats and native grasses, found both upon the hills and in the valleys, renders this a large sheep and stock growing county. Yuba is geographically surrounded as follows, viz: on the northwest by Butte; on the east by Sierra and Nevada; on the south by Nevada, Placer and Sutter, and on the west by Sutter county. Its extreme length, measured northeast and southwest, is fifty-seven, and its average width about eighteen miles. There are no lofty peaks within its limits; nor is any portion of the county, except the northeastern corner, extremely rugged or broken, though the river cañons gradually deepen, and the foot-hills swell to greater heights as they extend north and east into the Sierra.

The county is watered by the Feather river, separating it from Sutter on the west; by the Main Yuba and its Middle Fork; by Bear river, dividing it from Placer and Sutter counties on the south; by Honecut creek, its northwestern boundary, and by Dry creek, running centrally through it from northeast to southwest. Originally the banks of these streams were timbered along their lower portions, after the manner common in this region—a few oaks being scattered over the valley lands and lower foot-hills. But the most of this growth has now been removed, though there is still an abundance of fine timber along the eastern border and in the northern part of the county, where large quantities of lumber are made every year—Yuba containing seventeen saw mills, nearly all of which are kept steadily employed cutting lumber for domestic consumption. These mills have each capacity to make from four to twenty thousand feet of sawed stuff daily, and cost in the aggregate one hundred and thirty thousand dollars.

Located at Marysville, the principal town in the county, are a number of industrial establishments, the most important of which is a woolen mill, erected in 1867, and started in the month of September of that year. It is driven by steam, and has seven looms, with all the appurtenances requisite to the manufacture of blankets and flannels, the only goods thus far made. The fabrics turned out here, though not yet largely introduced in the general market, are approvingly spoken of by the trade. Marysville also contains a foundry and machine shop, a sash and door factory, soap works, and several other manufacturing establishments of less moment. The town is also provided with gas and water works of much greater capacity than its present population requires. A few years since there were many thousand pine trees tapped in this county, it having for a time shared with Butte the business of gathering and manufacturing the sap of this tree into rosin and turpentine. Latterly, but little has been done here, though the business would no doubt be resumed should these commodities undergo any appreciable advance in price.

The population of Yuba numbers twelve thousand, of whom about five thousand are residents of Marysville, the county seat and principal town in it. This place occupies a pleasant site on the west bank of Feather river, at the head of steamboat navigation on that stream. It is regularly laid out and well built up—the more central parts being composed of spacious fire-proof stores, hotels and other business structures, and the suburbs abounding in tasty mansions and neat cottages—the most of them occupying ample grounds planted with vines, fruit trees and vegetables, and embellished with ornamental shrubbery and flowers. Its position at the head of navigation secures to it a large trade with the country around, as well as with the mining towns and camps in the interior, and renders it the shipping point for almost the entire products of the county.

Camptonville, forty-one miles northeast of the county seat, is, next to the latter, the largest town in Yuba, it having a population of about six hundred. After this, taking them in the order of population, comes Smartsville, Brown's Valley and Timbuctoo, each having a population of two or three hundred in and immediately about it—there being many other villages in the mining districts, each of which forms the nucleus of a small and generally prosperous community, and the center of an active local trade. As in most of the mining counties, there are here many towns and camps which now number less than a tithe of the population they contained ten or fifteen years ago, when the placers about them were still rich and virgin.

The assessed value of the real and personal property in Yuba was fixed at four million one hundred and forty-one thousand dollars for he year 1866. The enclosed land amounts to about one hundred and thirty-five thousand acres, of which more than one fourth is under cultivation. Both here and in the adjacent counties, large tracts of land in the foot-hills are surrounded by fences of a cheap and temporary kind, merely for restraining stock. The principal grain raised is wheat, of which about seventy-five thousand bushels were grown in 1867. Large quantities of barley, oats, buckwheat and Indian corn are also sown every year—the yield of these cereals often being large. Fifteen acres planted to the castor bean in 1866 yielded two thousand three hundred bushels, the plant of 1867 having been much larger. Many cattle, horses, sheep and hogs are raised here, wool forming one of the leading exports of the county, and large quantities of ham and bacon being cured for market.

The culture of fruits and vines receives great attention in this county—the orchard of G. G. Briggs, near Marysville, being one of the most valuable in the State, both as regards extent, yield and excellence of fruits. Even in the foot-hills there are many large and prolific orchards and vineyards, some of them containing from three to five thousand apple trees, and over thirty thousand vines. Lemons, oranges, olives, almonds, etc., grow well in all the lower parts of the county, where, also, cotton and tobacco, of fair quality, can be raised with irrigation and a little extra care.

The real and personal property in Yuba was assessed for the year 1867 at $3,039,025, independent of the value of mines. The great advantages enjoyed for receiving imported goods in this county by means of the Sacramento river, and the railroad extending north from Marysville, and of shipping away its surplus products through the same channels, have added largely to the population and wealth of Yuba. The prospect of an early completion of the partially built and long delayed railroad between Marysville and Lincoln, whence there is already a road in operation to Folsom, promises a material increase of these advantages, inasmuch as this would secure to Yuba uninterrupted railroad communication with Sacramento and ultimately with San Francisco.

For a number of years the placer mines along the Yuba and elsewhere in this county proved extremely rich, some of this class of claims still worked here being among the most largely productive and remunerative in the State. Scarcely anything in the history of California mining has surpassed the success attending the working of the Blue Gravel claim, at Smartsville, in this county, during the forty-three months prior to December, 1867—the total amount taken out in this time having been $873,409, of which $564,500 were net profits. At Timbuctoo, an early mining camp two miles from this place, many millions of dollars have been washed out, the auriferous gravel, though worked as low as practicable with the present tunnels, not yet being exhausted.

The washing here, as well as in many other localities in the county, is performed by hydraulic pressure, sluicing, and the several other modes in use being also practiced. The most important quartz mining district in Yuba is that of Brown's Valley, where there are a large number of veins, some of which have been opened to considerable depths and found to be of good size, well walled, rich, and compact; the ore paying, by ordinary mill process, from twenty to thirty dollars per ton, the gold being mostly free and easily saved. A number of mills have been put up in this district, the net earnings of which have in all cases been fair, and in some quite large. There are twelve quartz mills in the county, the whole carrying ninety-six stamps, and costing in the aggregate $240,000. Some of these mills are large and very perfect in their appointments, having cost over $50,000.

Twenty-six canals and water ditches have been built, lying wholly or mostly in Yuba; only one of these, however, the Excelsior Canal, taking water from Deer Creek and conducting it to the diggings about

Smartsville, Timbuctoo, Rose's Bar, and other points further west, is of any great magnitude. This work has an entire length of one hundred and fifty miles, and cost over half a million dollars. The aggregate cost of the other ditches has been about $150,000.

### YOLO COUNTY.

This is exclusively an agricultural county, farming, dairying, stock-raising, and fruit growing, in their several departments, constituting the sole occupation of the inhabitants. Yolo has a long, irregular shape, its longitudinal axis reaching a distance of sixty miles northwest and southeast, and its width averaging about twelve miles. It is surrounded by the following counties, viz: Colusa, north; Sutter and Sacramento, east; Solano and Napa, south—Solano, Napa, and Lake lying to the west. The eastern half of the county is almost a dead level. Succeeding this flat portion on the west is a belt of slightly undulating prairie, which gradually rises into the lower slopes of the Coast Range of mountains, that cover the western parts of the county. The level district consists mostly of a rich alluvial soil; a strip bordering the Sacramento river and Sycamore Slough, varying in width from two to five miles, being tule land. The bottoms along Putah and Cache Creeks, the latter running centrally through the country, and the former skirting its southern border, are among the most fertile in the State. Cottonwood, sycamore and willow grow along the water courses, and oak sparsely, with a little pine on the foothills of the Coast Range. As the amount of timber fit for making lumber is limited, there are but two saw-mills in Yolo; one of which, situated at Washington, on the Sacramento river, obtains its timber supply from points outside the county.

Yolo being, so far as discoveries extend, destitute of metaliferous or mineral deposits, and having, therefore, no occasion for canals, quartz mills, or reduction works, none have been built within its limits. Neither has much money been laid out in the construction of roads, or in the erection of machinery for manufacturing purposes; the level and open character of the country requiring but few improvements of the former kind, while the liberal rewards that have generally attended agricultural pursuits have tended to discourage the introduction of new industries.

The population of Yolo numbers about ten thousand, the most of whom reside upon farms, and are very generally distributed over the county. Woodland, the county seat, located on the south side of Cache creek, eight miles west of the Sacramento river, contains about one thousand two hundred inhabitants. Knight's Landing, ten miles north of Woodland, has a population of about five hundred. Being on the Sacramento river, and in the vicinage of a rich farming district, large quantities of grain and other agricultural products are shipped hence every season. Washington, containing about two hundred inhabitants, situated on the west bank of the river, opposite Sacramento city, is also the supply and shipping point for a considerable extent of back country. Yolo, Charleston (formerly Fremont), Prairie, Cache Creek, and Buckeye, are towns of less size, scattered over the eastern and southern sections of the county.

The assessable property in Yolo was valued in 1866 at $2,390,232. The quantity of fenced land amounts to about 170,000 acres, of which 90,000 are under cultivation, the most of it being planted to wheat and barley. Of the former, 48,000 acres were sown in 1866, producing nearly 1,500,000 bushels of grain; the breadth planted the following year having been somewhat broader, though the total product was scarcely so large. The quantity of barley raised here at one time greatly exceeded the wheat—less having been sown the past few years.

The wheat crop for 1866, was 867,590 bushels, raised on 26,408 acres —only 18,075 acres being sown the following year. During the year 1866, 10,000 bushels of oats; 1,250 of rye; 16,120 of Indian corn; 150 of buckwheat; 200 of peas; 4,000 of castor beans, and 4,042 of peanuts, together with 1,500 pounds of tobacco, and six of silk cocoons were raised. Eight hundred and eighty-four acres of broom corn were planted; 97,020 pounds of butter, 7,040 of cheese, 162,680 of wool, and 26,244 of honey were produced the same year, besides large quantities of hay, potatoes, beets, onions and other vegetables. In 1866, Yolo contained the following number of fruit trees: 29,430 apple; 31,351 peach; 12,148 pear, with a considerable number of other fruit trees, including a few of the lemon, orange, and olive. There were then 157,434 grape vines growing in the county, 18,637 gallons of wine and 5,687 of brandy having been made from the vintage of that year. According to the Assessor's report for 1866, Yolo contained 59,166 sheep; 14,644 hogs; 4,480 horses; 1,976 mules; 2,492 cows, and 4,604 beef cattle, besides a small number of oxen, asses, calves, goats, etc.

There are three grist mills in the county carrying seven run of stone, there being about 35,000 barrels of flour made annually. In seasons of extreme drouth this county suffers in common with most of those lying within the rim of the great interior basin, formed by the valleys of the San Joaquin and Sacramento, the average yield of the crops here having fallen some years as low as eight bushels of wheat to the acre—the ordinary average being over twenty. It has occurred here that not enough of this cereal has been raised during one of these unfavorable years to suffice for seed for the next. The vegetable crop, however, more particularly the potatoe, being planted mostly on the tule lands, never fails; over two hundred sacks of the latter being produced to the acre nearly every year.

## SOLANO COUNTY.

This county, which has an average length of about thirty miles east and west, with a width of twenty-eight miles, is bounded on the north by Yolo; on the east by Yolo and Sacramento; on the south by Contra Costa county, the Bay of Suisun and the Straits of Carquinez ; and on the west by Napa county. This ranks among the most wealthy, populous and largely productive agricultural counties in California; it producing the most hay of any one, and containing, next to Santa Clara, the greatest amount of land fenced and under cultivation; and raising, next to that county, the largest quantity of wheat of any in the State. Nearly all the inhabitants, with the exception of such as reside in the towns and villages, are employed in some of the various departments of farming, fruit growing, or stock raising.

The surface of the county consists mostly of fertile valleys, tule lands, undulating prairies and high rounded hills—there being no mountain ranges or isolated peaks within its limits. Some portions of the tule bottoms, which embrace an area of ninety thousand acres, having been reclaimed, are found to make valuable garden, grain and meadow lands—the crops planted upon them never failing, however dry the season. The whole country, even to the summits of the highest hills, was originally covered with wild oats, bunch and other native grasses; large areas of which undisturbed by the plough still remain, furnishing abundant pasturage for the extensive herds of stock that feed upon it winter and summer. The soil nearly everywhere is a rich, clay loam; that in the valleys and along the streams being deep and extremely productive. Including the tule marshes, fully two thirds of the land in the county may be considered arable, the balance affording at least enough grass to render it valuable for sheep and cattle ranges.

Solano, though tolerably well watered by a number of small streams and sloughs running across it, is one of the most sparsely timbered counties in the State; the prairies and hills being barren of trees of any kind whatever, while the growth along the water courses, originally limited in extent, is now nearly all cut away. It contains no quartz mills or mining ditches—no metaliferous deposits of importance having ever been found within its borders. There is, however, on the hills near Suisun valley, an extensive and valuable bed of marble, which has been worked for the past ten or twelve years, and from which considerable quantities of stone have been taken both for ornamental and building purposes. Some of the blocks broken out here have been of large size, frequently measuring from seven to nine hundred cubic feet. This marble, which is fine grained and compact, readily receiving a high polish, bears in its rough state a strong resemblance, in color, to rosin. The chips, and such pieces of the stone as are unfit for dressing, are burned into lime, of which they make an excellent article.

In the hills adjacent to Benicia, a species of lime stone, lying in small veins, is found, from which is made a very superior hydraulic cement. After being quarried, this rock is burned in kilns and then ground into an impalpable powder, extensive works having been erected near the quarries for the purpose of burning and grinding it. Near this town, as well as at several other points in the county, are located mineral springs, some of which are much resorted to on account of the sanitary properties of their waters.

The assessable property of Solano, in 1866, was set down at $4,042,000, and the population at 15,000—both of which have since been somewhat augmented. It contains two considerable towns—Benicia, on the Straits of Carquinez, with a population of 1,600, and Vallejo, three miles to the northwest, with a population of about 2,000. The former was laid out in 1847, and being at the head of ship navigation on the waters of the bay, and thirty miles nearer the interior than San Francisco, it became at one time a sharp competitor with the latter for the position of commercial metropolis of the Pacific. Failing in this, it became twice the capital of the State, the inhabitants having put forth strenuous efforts to make it the permanent seat of the State government.

The extensive foundries and machine shops of the Pacific Mail Steamship Company having for many years been located here, have added much to the population and business of the place. One mile east of the town are located the arsenal and barracks belonging to the General Government, an important auxiliary to the trade of Benicia and the country adjacent. The local industry of the place is further aided by the extensive cement works situated near it—by two tanneries, employing quite a large force of hands, producing considerable quantities of excellent leather, and by a first class flouring mill, recently erected, carrying five run of stone, and capable of grinding four hundred barrels of flour daily.

This town has for many years been distinguished for the number and high literary character of its institutions of learning, some of them being among the earliest established in California, and all ranking with the most popular and flourishing establishments of the kind now existing in the State. Chief among these literary institutions is the Benicia Female Seminary ; the Benicia College and Boarding School, and the St. Catharine's Academy, conducted by the Sisters of St. Dominic, together with a liberally patronized and efficient Law School.

Vallejo, founded in 1850, became afterwards, like Benicia, an aspirant for the State capital, which, having been located there in January, 1852, was soon after removed, the terms stipulated for on the part of the State having failed to be complied with. The United States have established here a Navy Yard, which, though but partially completed, has been projected on a scale so grand and perfect that it promises to be, when finished, one of the most complete and extensive works of the kind in the world, the entire cost involving an expenditure of some eighteen or twenty million dollars.

An area of thirty acres of land, exclusive of water surface, having been secured by the General Government on Mare Island, opposite the town, and the whole having been graded to the proper level, there have since been erected upon it immense storehouses, smitheries, foundries, carpenter and machine shops, timber sheds, and quarters for officers and workmen, the whole constructed of brick, on the most improved plans and in the most substantial manner. Stone quays, sectional dry docks, basins and railways—a magazine, shell-house and cisterns, and other necessary appurtenances have here been built, all with a view to the greatest attainable efficiency and permanency, and on a scale, not only equal to the present wants of the navy and the commercial marine of the Pacific coast, but adequate to the vastly increased demands upon the capacities of a work of this kind that are likely to grow out of the future. In cases where private dry docks are insufficient to accommodate merchant vessels, they can be put upon the Government works by simple payment of expenses of repairs, and of operating the same.

Vallejo is a pleasant and prosperous town, enjoying, by virtue of its position, certain natural advantages which, if properly improved, can scarcely fail to make it a place of considerable industrial activity and commercial importance. Possessing an equable and salubrious climate; capable of being approached by vessels of the largest burden; backed by a rich agricultural district, and likely to be the terminus of one, and perhaps several railroads, connecting it with points further in the interior, it seems destined to be a town of much future importance.

Fairfield, the county seat, a village containing four or five hundred inhabitants, is situated on the east side of Suisun Slough, near the center of the county.

Suisun City, located one mile south of Fairfield, and having a population of about one thousand, is a town of considerable local importance, being at the head of steamboat navigation on the slough, which, up to this point, is much wider and deeper than any of the other navigable sloughs of the State. Steamers run direct from this place to San Francisco daily, whence it is distant fifty-four miles. Numerous small sailing vessels also ply constantly between these two points, this being the embarcadero for more than half the products of the county. The town, which is ten miles in a straight line from Suisun Bay, and sixteen by the slough, is surrounded by tule lands to the extent of one mile on every side, the site being scarcely more than a foot above the water at ordinary stages, and being overflowed by the spring tides, except such lots as may have been raised by filling them in with earth, or protected by embankments. Fairfield, occuping a site on the edge of the tule marsh, is located on the line of the projected railroad route from Benicia to Marysville.

At Vacaville, a town of 400 inhabitants, situated in a rich agricultural district, twenty miles northeast of Fairfield, there is a flourishing literary institution, known as the Pacific Methodist College. Collinsville, a landing on Suisun Bay, near the mouth of the Sacramento river, is worthy of note as being a point at which the steamers plying between San Francisco and Sacramento touch during the salmon season, and take on large numbers of these fish, more being shipped here than at any other place in the State.

From Rio Vista, a town of two hundred inhabitants, twenty miles above, many of these fish are also sent every day to San Francisco. Silveyville, Maine Prairie, Denverville and Rockton are small rural villages situate in different parts of the county, containing each from fifty to three hundred inhabitants.

According to the Assessor's reports for 1866, there were 480,000 acres of land enclosed in Solano that year, of which 175,800 were under cultivation. One hundred and forty-one thousand acres sown to wheat and 21,000 to barley, produced, the former 2,117,250, and the latter 525,000 bushels. The estimated area planted to these grains, in 1867, was 160,000 acres of wheat and 18,000 of barley. In 1866, four hundred acres of oats yielded 8,200 bushels; 10 acres of rye yielded 190 bushels ; 510 acres of Indian corn yielded 10,800 bushels, and thirty acres of buckwheat yielded 675 bushels. Twenty-three thousand five hundred tons of hay were cut, and 3,300 pounds of tobacco were raised, the latter on seven acres of land. The product of butter for the year was 60,000 pounds ; of cheese, 15,000 pounds ; of honey, 2,500 pounds, and of wool, 280,000 pounds. The grape vines in the county numbered 950,600, from the vintage of which 84,350 gallons of wine and 5,470 of brandy were made. Solano, while it raises a good many apples, peaches, and pears, is not remarkable as a fruit growing county. In 1866 it contained 8,440 horses ; 1,470 mules ; 35,600 sheep ; 12,300 hogs, and 14,215 head of neat cattle. There are three steam flouring mills in the county, the whole carrying nine run of stone, and having cost in the aggregate about $100,000.

## SACRAMENTO COUNTY.

This county, deriving its name from the Sacramento river flowing along its western border, is bounded northerly by Sutter and Placer, easterly by El Dorado and Amador, southerly by San Joaquin, and westerly by Solano and Yolo counties. Its average length, measured north and south, is thirty-six, and its width about thirty miles; giving it a superficial area of six hundred and ninety-one thousand two hundred acres. The surface, with the exception of a strip six or eight miles in width on its eastern side, which rises into low ridges and rolling prairies, is almost entirely level. Stretching along the Sacramento river is a belt of tule land, which continuing quite narrow until it has reached the middle of the county, gradually expands to a width of fifteen or sixteen miles. Skirting this tule marsh is a strip of rich alluvial soil, varying in width from two to five miles, where, the surface gently rising, the soil becomes more light and gravelly, and is less certain of producing good crops except in extreme wet seasons. The low hills to the east of this belt, possessing a warm red soil, bring good crops of grain when carefully tilled and the season is not unusually dry. Upon these hills grow scattered oak trees; the timber elsewhere, consisting mostly of oak, sycamore and cottonwood, being confined chiefly to the alluvial flats and the banks of the streams. The timber belt along the Sacramento was at one time so broad and dense as to render the navigation of that stream difficult by sail vessels, this craft often being several days making the passage even with a favorable wind from the mouth of the river to the Embarcadero, as the landing where Sacramento city now stands was called prior to and for some time after the American occupation of the country.

Flowing across the northern end of the county, from northeast to southwest, is the American river; the Cosumnes running centrally across it in the same direction. Dry Creek, having a nearly parallel course, separates this from San Joaquin county. The two last named streams reach the Sacramento through the broad expanse of tule marsh by many devious channels; the whole constituting such a labyrinth of creeks, lakes and sloughs, that only those well acquainted with them can attempt their passage with safety. The main Sacramento river, also separated as it flows south into diverse branches called sloughs, some of which are very intricate, runs across the broad tule bottoms in crooked channels, cutting them up into numerous small and several large islands. The same is the case with the San Joaquin river in the next county south, where there is a still greater area of these marshes, and where this system of islands and sloughs is still more wide spread and complicated.

The county of Sacramento, apart from its agricultural and mineral wealth, the latter considerable and the former very large, enjoys many advantages, some being the result of the enterprise and sagacity of its inhabitants, and others incident to its geographical position. Owing to these auspicious circumstances and its favorable location, the industries of the city and county have been considerably varied—commercial, farming, and mining pursuits engrossing the attention of the inhabitants in an almost equal degree, while manufacturing and mechanical pursuits have not been neglected.

Situated at the head of navigation for large vessels on the Sacramento, backed by a rich farming and mineral region immediately adjacent, and connected with the more remote interior by means of well constructed wagon roads and railways, and with the country above by rivers navigable for smaller craft, its trade, already large, is likely to attain still greater proportions in the future. The manufacturing interests of the city and county, though not yet much diversified, are quite extensive, consisting of nearly all the occupations and callings found in California.

In the city is the large foundry and machine shop of Goss & Lambard, manufacturing every manner of engine and machinery made from iron, brass, or copper, and having a capacity to employ a hundred workmen. The products of these works, which are large, have a good reputation throughout all the central and northern mining districts of California and the State of Nevada. The Union Iron Works, lately much improved and enlarged, are also doing a prosperous business. The immense workshops of the Central Pacific Railroad Co. employ a large force of hands, and contribute materially to the wealth and prosperity of the city. Three steam flour mills, the Lambard, with four, the Phœnix, with three, and the Pioneer, with six run of stone, having a joint capacity to turn out eleven hundred and fifty barrels of flour daily, are kept constantly busy during the grinding season; there being two other flouring mills in the county—one of a single run of stone, at Michigan Bar, and one of four run at Folsom. The Granite Mill, at Ashland, carrying five run of stone, not long since destroyed by fire, is about to be rebuilt.

Besides these mills and works, there are in the city two steam saw mills, of large capacity, one having a planing machine and a sash and blind factory attached. There are also two door, sash and blind factories, run by horse power; an iron door and shutter factory, two potteries, a broom, a soap, a glue, and a candle factory, with many minor establishments, making various articles of utility, and giving profitable employment to local capital and a large aggregate number of workmen.

The city abounds with spacious halls erected for the use of various benevolent and literary associations and orders, contains a number of good hotels, several fine edifices erected for the purposes of religious worship, amusement, the making of laws, and for the administration of justice—the county court-house, used also for the sessions of the State Legislature, being one of the best constructed buildings in the country Here is now being erected the State Capitol, an edifice which, when completed, will not only surpass in the grandeur of its proportions, the splendor of its architecture, and the durability of its materials, all other structures on the Pacific coast, but which will compare favorably with any of the capitol buildings of the older States.

Sacramento city contains a number of high schools of acknowledged excellence, has an efficient fire department, extensive gas and water works, several large well selected libraries apart from that belonging to the State, and can justly boast of a newspaper press hardly second to any other, whether here or elsewhere, in point of ability and enterprise.

Located in the edge of the town are the extensive grounds, with booths and other necessary appendages, of the State Agricultural Society; the elegant and spacious pavilion, erected by the citizens for the use of that institution, being within the limits of the city. Running out of Sacramento are two railroads, one extending to Shingle Springs, El Dorado county, a distance of forty-six and a half miles, and the other, the Central Pacific, running across the Sierra Nevada, and now completed to a point distant one hundred and fifty miles east of the city, with the prospect of being extended at least three hundred miles further by the end of 1868.

Spanning the Sacramento river, opposite the city, is the Yolo Bridge, eight hundred feet long and twenty-eight wide, one of the finest structures of the kind in the State, and built so substantially that it has been able to resist all the floods occurring since its erection. There are several other costly bridges in the county, built for viaducts or aqueducts across the American and Cosumnes rivers.

Not a city in California has suffered more frequently and severely from conflagrations and floods than Sacramento, it having been extensively damaged by the latter on several occasions, and been two or three times swept nearly out of existence by fire. It has also been the scene of violent and bloody contentions growing out of conflicting land titles, from all of which, aided by its natural advantages, and sustained by the persevering spirit of its people, it has managed to recover, advancing steadily in wealth, population and business. In its numerous fireproof buildings and extended water works, the city now finds ample protection against further sweeping conflagrations, while in its system of broad levees, encompassing it on every side, it enjoys an almost certain immunity from disastrous floods.

The city, which besides being the State Capital, is also the county seat, is shown by a recent census to contain 15,987 inhabitants, 8,374 of whom are white males, and 6,243 white females, the balance consisting of the colored and mixed races, five hundred of the number being Chinese.

Folsom, the next important town in the county after Sacramento city, whence it is distant twenty-two miles in an easterly direction, contains about eighteen hundred inhabitants. Being on the railroad, and surrounded by a considerable scope of mining country, as well as a good farming district, it enjoys an active local trade ; the extensive granite quarries in the neighborhood also giving employment to many hands. Near the town, on the banks of the American river, most of the cobble stones used for paving the streets of San Francisco are collected.

Mormon Island, three miles east of Folsom, is a mining town with a population of three or four hundred. Gold washing was commenced here within a few days after its introduction at Sutter's mill, having first been engaged in by the Mormons—whence the name. The bar at this place, though long since exhausted, was originally very rich, the discoverers having taken out large sums in a short time. There are still moderately good diggings in the river banks and flats about the town; the country for ten or twelve miles in nearly every direction around Folsom being auriferous, and some spots paying more than average wages. There are a number of other small towns in this county, the most of them situated in the agricultural districts, containing each from fifty to three hundred inhabitants, the population of the entire county numbering about twenty-four thousand.

Besides a number of rich bars originally found on the American and Cosumnes rivers, within the limits of this county, there is along its eastern border an auriferous belt, six or eight miles wide, which, for a few feet on the surface, and in some places to a much greater depth, has been found to pay remunerative wages. For the purpose of supplying water to these diggings and others lying in the adjoining county of El Dorado, a number of canals have been dug the length of these works, within the limits of this county, being about thirty miles. Although there are many promising quartz veins in Sacramento, they have not yet been much prospected, only a single five-stamp mill having been erected in the county.

The following data, derived from official sources, will convey a good idea of the agricultural capacities, and of the products of this county, for the year 1866: Number of acres of land enclosed, 213,261; under cultivation, 92,520; wheat planted, 9,870 acres; barley, 38,147 acres—yielding 192,170 bushels of the former, and 863,214 bushels of the latter. Of these grains, there were 5,400 acres of wheat, and 30,000 of barley sown in 1867. In 1866, there were raised 19,230 bushels of oats, 34,237 of Indian corn, 553 of peanuts, 22,327 tons of hay, and 38,300 pounds of hops, together with large quantities of fruits, vegetables and other miscellaneous products. During the same year 379,350 pounds of butter, 12,000 of cheese, 269,365 of wool, and 15,519 of honey were produced. The county then contained 93,303 apple, 89,067 peach, 36,830 pear, with a large number of other fruit trees. There were 951,315 growing vines, from the vintage of which 63,879 gallons of wine and 5,714 of brandy were made. The stock in the county consisted of 8,873 horses, 1,828 mules, 12,144 head of neat cattle, 11,339 hogs, and 49,996 sheep. Touching certain products, mentioned above, Sacramento is said to grow them of better quality, if not, also with greater facility than most other counties in California. Thus, the hop grows here with great luxuriance, the quantity raised in 1867 having been 160,000 pounds—more than four times as many as were picked the year before—making this the largest hop producing county in the State. So also with peanuts, of which there were 4,000 bushels gathered in the same year; those raised in Sacramento possess, it is claimed, a superior flavor. The real and personal property in the county, omitting mines, was assessed for the year 1866 at $9,443,601.

### SAN JOAQUIN COUNTY.

This county, named from the principal river flowing through it, has an average width of about forty by a breadth of thirty-five miles, and is bounded as follows, viz: By Sacramento county on the north; by Amador, Calaveras and Stanislaus on the east; by Stanislaus on the south, and by Alameda and Contra Costa counties on the west. San Joaquin is almost exclusively an agricultural county. At one time a good deal of placer mining was carried on in its northeastern part, but at present very little is being done in this or any other department of mining. Neither have any important deposit of minerals or metals, other than gold, been found here. The county occupying the lowest point of depression in the great San Joaquin valley, the metaliferous formations, except along its eastern border, have been deeply buried beneath the heavy mass of alluvium and detritus washed from the surrounding mountains—and thus placed beyond the easy reach of mining exploration. That this deposit has a great depth, is shown by the fact that an artesian well, sunk to the depth of one thousand and two feet, failed to reach the bed rock, which probably lies much lower. While so little attention has been given to mining, but a limited manufacturing interest has been developed in San Joaquin, almost the sole pursuit of the inhabitants having been agricultural or commercial—the trading community of Stockton and the grain growers of the county at large composing fully ninety per cent. of the population.

Of the 896,000 acres comprised within the limits of the county, three-fourths, or perhaps a larger proportion, are capable, in favorable seasons, of producing good crops of grain. Along the San Joaquin river, which spreads out into numerous sloughs, there is, in the northwestern part of the county, an immense expanse of tule marsh—not less in the aggregate than 200,000 acres, much of which is covered at all times by a few inches of water, nearly the whole being submerged at high stages of the tide. Late in the season, however, before the streams have been raised by the winter rains, large sections of these lands becoming dry on the surface—the dense body of rushes, the growth of former years, having meantime wilted and dried up, the latter often take fire, and burning with terrific fierceness for days in succession, many thousand acres are burned over and stripped of both the dead and living tules. In all the counties containing large tracts of tule lands, these fires are common, generally occurring in the fall and winter. Nor are these conflagrations confined wholly to the rush lands. They often break out in the grass and herbage, which late in the summer become dry as tinder, and sweeping over the plains and mountains, leave millions of acres scorched and blackened, though the heat is not generally sufficient to injure the forest trees or larger shrubbery.

This county contains no timber fit for making lumber, and very little that answers even for fencing purposes. Most of the water courses are lined with a narrow fringe of oak trees, a few of which are also found scattered over the plains in the vicinity of Stockton ; but fully three-fourths of the county is treeless, the banks of the San Joaquin, unlike those of the Sacramento, being almost wholly without timber. Lumber, however, is obtained at moderate rates from the heavily wooded mountains to the east ; the teams engaged in hauling supplies to the mining districts in that quarter, in the absence of other freight, bringing back return loads of lumber, thereby rendering this article cheap and abundant in Stockton, whence most of the county derives its supply.

Though crossed by several large streams, this county is not generally well watered, many portions suffering from the long dry seasons severely. This is especially the case with the districts lying west of the San Joaquin river, as well also as with those stretching along the base of the foot-hills in the eastern part of the county. The soil, however, being nearly everywhere deep and strong, the cereal crops are almost uniformly good, their yield being generally above the average throughout the State. A large proportion of the soil in this county is composed of a stiff black clay, known in California as "adobe" land, and which, though extremely fertile and capable of producing heavy crops when in proper condition for receiving the seed, owing to its retaining the water near the surface, is difficult to cultivate. In dry winters it is easily managed, and more certain to bring a crop than the sandy, gravelly soil, of which there is fortunately a great deal ; patches of it often lying adjacent to the heavy adobe lands, giving the farmers a chance to select such kind as seems best suited to the season. Large portions of the rich bottom land along the Mokelumne river, and other streams in this county were seriously injured, some of it wholly ruined by the sand and gravel brought down and deposited upon them by the floods of 1867–8. These deposits varied in depth from a few inches to ten or fifteen feet ; this mischief, unhappily, not having been confined to this county alone, many of the alluvial bottoms along the Sacramento and San Joaquin rivers and their numerous tributaries having suffered in like manner.

From the assessor's report are derived the following statistics touching the agricultural products of this county for the year 1866: Acres of land fenced, 254,540; under cultivation, 123,855; sown to wheat, 69,132—product, 1,139,911 bushels; sown to barley, 48,294 acres—product, 922,000 bushels; 9,275 bushels of oats; 12,994 of rye, and 26,065 of Indian corn were raised; 13,657 tons of hay were made from 14,629 acres of land; 325,615 pounds of butter; 9,465 of cheese; 130,618 of wool, and 26,775 pounds of honey were produced; apple trees in the county, 47,673; peach, 46,591; pear, 8,917, with considerable numbers of plum, cherry, nectarine, prune, quince, apricot, almond, mulberry, and fig trees; vines, 493,387; wine made, 23,347 gallons; brandy, 500 gallons; number of horses, 8,836; mules, 830; neat cattle, 13,195; sheep, 26,278; goats, 650; swine, 13,000. There are in the county six steam flouring mills, eighteen run of stone; but no saw mills or quartz mills, neither vein mining nor lumber making being carried on here. A few small ditches have been dug for irrigating purposes, but none for conducting water into the mines, though one or two, lying mainly in other counties, extend a short distance into this. The value of the real and personal property in the county, fixed by the assessor at $5,684,105 for 1866, has been largely increased since—the wheat crop of 1867, estimated at 1,686,566 bushels, being alone valued at $1,870,239. Large areas of land have been fenced and brought under the plough since the assessor's estimates were made for 1866—the amount of land now enclosed being over 300,000 acres, of which two thirds are under cultivation. The breadth of land planted to wheat in 1867 was 91,790 acres.

The open and level character of the country rendering the building of wagon roads not an absolute necessity, but few of these improvements have been made within the county. Two graveled roadways, however, have recently been completed, leading from Stockton across the adobe flats, by which the town is surrounded to the higher and firmer lands beyond—one of these having cost the sum of $15,000, and the other $35,000.

The county, in its corporate capacity, has extended liberal aid towards the construction of two important wagon roads across the Sierra—the Sonora and Esmeralda, and the Big Tree and Carson valley roads—issuing its bonds in the sum of $50,000 to each. It has also subscribed $250,000 to the stock of the Western Pacific Railroad, designed to connect Stockton with San Francisco, and $100,000 to that of the Stockton and Copperopolis Railroad, both likely soon to be built.

The population of San Joaquin county numbers about 18,000; a larger proportion of whom are women and children than is common in most California communities. Stockton, the county seat and principal city in this part of the State, contains about 6,000 inhabitants. It is situated in the center of the county, at the head of a navigable slough, running east six miles from the San Joaquin river. It is surrounded by a rich agricultural district, and is connected by means of good wagon roads with all the important mining counties lying to the east and south. Stockton occupies a favorable commercial position, being the entrepot and shipping point for an immense agricultural region, all of which, together with the vast area of mining country lying beyond, must draw from it the greater portion of their supplies. Even now it may be said to command in a great measure the trade of nearly five thousand square miles—a business that will be still further extended when the several projected railroads to center here shall have been completed. At present, there is a large number of sailing vessels, with a daily line of steamers, plying between this place and San Francisco. During the year 1867, the arrivals at the levee in this town were 619 steamers and 447 sail vessels; the former having a carrying capacity of 76,000 tons, and the latter of 70,000 tons; the whole representing an annual freight and passenger traffic equivalent to 146,000 tons. Besides the daily line of steamers running to San Francisco, there are three small steamers plying on the San Joaquin river, which is navigable for this craft, at favorable stages of water, for a distance of 150 miles above Stockton. During the year 1867, there were shipped from this place to San Francisco 864,233 bushels of wheat, valued at $1,141,878, and 50,791 bushels of barley, valued at $34,142. The wool, hides and tallow sent away amounted in value to $216,258; poultry, eggs and vegetables, to $142,462; wheat, barley and Indian corn, ground, to $697,378. The total valuation of the flour and meal ground in the county amounted to $828,528, of which all but $131,256 in value was the product of the mills in Stockton. Thus, it will be seen that there was sent from this place, during the year mentioned, agricultural products alone amounting in value to $2,234,119. Besides these staples, a greater or less quantity of minor commodities are every year shipped here for San Francisco, or markets abroad—the shipments of copper ore having, for several successive years prior to 1867, constituted an important item in the exports of this town.

While the business of Stockton consists chiefly in its trade and commerce, certain mechanical and manufacturing industries have been gradually growing up in the place, until some of these have attained to very respectable proportions. The Globe Foundry and Machine Shop, located here, has a good reputation for work done in its line—some of the steam engines made thereat being in use in nearly all the adjacent mining counties, and even in districts east of the Sierra Nevada. There are also several tanneries in and around Stockton—some of them quite extensive, and all enjoying a good reputation for the leather they make. Most of the mechanical branches usual in towns of this kind are carried on here, blacksmithing and wagon making being very extensively engaged in.

Stockton having been laid waste several times by fire, enjoys in its present efficient fire department, artesian water works, and numerous brick buildings, a good degree of security against this destructive element. The artesian well sunk near the center of the city pours out about three hundred and sixty thousand gallons of water per day, which rises eleven feet above the orifice whence it issues, and nine above the established grade of the city. It is soft and pure, and has a temperature of seventy-seven degrees as it comes from the ground. Though it has now been flowing for more than ten years, the volume discharged has suffered no abatement.

During the year 1867, over $200,000 were expended in the erection and improvement of buildings in Stockton; the city having in the meantime laid out $85,000 in raising and graveling the levee and principal streets, and the further sum of $50,000 on the two graveled roads before mentioned—making a total expended on these several improvements of $335,000. Notwithstanding these heavy outlays, to which are to be added the ordinary expenses of administering the city government, the local taxes for the year were reduced ten cents on the dollar; the finances of both the city and county being in a highly flourishing condition.

A savings' bank founded in Stockton in 1867 had over $500,000 on deposit, and was paying good dividends within six months from the time it was opened—the stock commanding a handsome premium. Within the present year a bank, with a capital stock of $250,000, has been established in the place, the leading monied and business men of the town and county being the subscribers for the stock.

While the material interests and industries of Stockton have been thus wisely cherished and cared for, the religious, social and educational well being of the people has not been neglected. The town contains fourteen churches and ten school houses—some of both classes being large and handsome edifices. Several of the school houses are used as academies and seminaries for instruction in the sciences and higher branches of learning. Here a spacious and substantial court house, standing in the center of a plaza ornamented with trees and fountains, has been built by the county; while the State Lunatic Asylum, consisting of an immense brick structure, with extensive wings and out-buildings, all constructed after the most approved models for establishments of this kind, occupies a beautiful grove of ancient oaks on the edge of the town. Around it are extensive gardens and pleasure grounds, a part cultivated to vegetables and a part planted with flowers —the whole being penetrated by broad avenues and walks, and furnished with seats and arbors, rendering it a fitting resort for the unfortunate beings confined here for treatment.

According to the very able report of the Superintendent, dated October 1st, 1867, this institution then contained 769 patients, of whom 552 were males, and 217 females. During the year, 313 new patients were admitted ; 125 were discharged, recovered ; 14 were discharged, improved ; 89 died, and 9 made their escape. The ratio of recoveries to the admissions has been 40 per cent. ; the number of deaths, 8.80 per cent. of the whole number treated, which does not vary much from the average since the founding of the institution in 1851.

## STANISLAUS COUNTY.

This county, named after one of the principal rivers flowing through it, is bounded on the northwest by San Joaquin county ; on the northeast by Calaveras and Tuolumne ; on the southeast by Merced, and on the southwest by Santa Clara county. It extends forty-eight miles measured northeast and southwest, and about twenty-six miles in a transverse direction, containing 798,720 acres, of which a large proportion is choice farming land. In the eastern part of the county, along the Stanislaus and Tuolumne rivers, there were formerly good placer mines ; but these having through many years of steady working become greatly depleted, mining in this county now forms but a secondary branch of business, three-fourths of the inhabitants being engaged in grain growing, dairying, and sheep and cattle raising.

The greater portion of the county is level, only the eastern portion being somewhat undulating, and in a few places broken into slight ridges and ravines, while a strip a few miles wide on its western border rises into the Coast Range, having here a general altitude of about two thousand feet. With the exception of a few scattered oaks along the larger streams, and a sparse growth of the same trees interspersed with an inferior species of pine found on the eastern foot-hills, the county is destitute of timber. Owing to this circumstance it is also without saw-mills, deriving its lumber supply, like San Joaquin and most of the other agricultural counties, from the forests along the lower slopes of the Sierra. The principal streams traversing it are the San Joaquin, the Stanislaus, and the Tuolumne rivers, all flowing in a generally northwest direction. Besides these, it contains only a few small creeks and sloughs, mostly dry except in the rainy season. Stretching along the San Joaquin is a belt of tule land, a mile or two wide; the whole of which could easily be reclaimed, the most of it being quite dry in the summer and autumn. Along these water courses, especially the larger rivers, extend broad bottoms of exceedingly rich soil, upon which the crops hardly ever fail, either from excess of rain or drouth. Much of the land on the higher plains between the rivers is also very productive ; and, like the river bottoms, the soil, being an intermixture of sand and loam, is easily tilled, and when properly prepared, almost certain to make a good crop.

While mining here is, as stated, but a subordinate interest, it still gives employment to quite a large population, who pursue it chiefly in the vicinity of Knight's Ferry, once a largely productive placer district, and also to some extent on the Tuolumne river, a few miles further south. Water to these diggings is furnished by five different ditches, lying wholly or partially within the county, the sources of supply being the Stanislaus and Tuolumne rivers and Littlejohn's creek. These several works have a united length of forty-three miles, a capacity to discharge five hundred inches of water daily, and cost in the aggregate about $180,000. Stanislaus contains no quartz mills, no auriferous lodes having yet been developed here, if, indeed, any of known value have been discovered.

The population of this county numbers about 3,500, of whom 600 reside in and around Knight's Ferry, the county seat, and 250 at La Grange, sixteen miles to the southeast. Horr's Ranch, eighteen miles south of the county seat, a small agricultural hamlet, Paradise city, near the junction of the Stanislaus and San Joaquin rivers, and Tuolumne city, at the head of steamboat navigation on the Tuolumne river, are the only other villages in the county. The last two places being in a good agricultural neighborhood, and approachable by small steamers, already ship considerable quantities of produce every year, enjoying a lively trade with the adjacent districts, and will, doubtless, increase as the latter fill up with settlers.

In so far as the assessor's report for 1866 may be accepted as correct, there were then in this county 60,100 acres of land enclosed 30,150 being under cultivation; 11,190 acres were sown to wheat—product, 150,662 bushels; 14,308 were sown to barley—product, 181,349 bushels; 560 acres planted to Indian corn yielded 15,560 bushels; 3,450 tons of hay were made from 3,530 acres of land mown; 50 acres of broom corn were planted—and 8,560 pounds of butter, 6,000 of cheese, 264,600 of wool, and 6,000 of honey, were produced. The numbers of horses, sheep, swine, cattle, etc., were as follows: Of horses, 2,751; of mules, 255; of sheep, 75,600; of goats, 200; of swine, 6,127, and of neat cattle, 5,273. Though fruits and vines thrive well in this county, only a moderate share of attention has been given to their culture, the total number of apple trees in 1866 having been but 5,017, and of peach of 3,069, the number of fruit trees planted of other varieties having been quite insignificant. Of vines, there were 112,310 growing; the wine made that year amounting to 12,520; the brandy to 200 gallons.

There are two grist mills in the county, both driven by water, and carrying jointly five run of stone. They cost about $40,000, and are capable of grinding 180 barrels of flour daily. But few wagon roads have been built in Stanislaus, the nature of the country not calling for any large expenditure in this direction. The assessable value of the real and personal property in the county was set down in 1866 at $1,204,230.

## MERCED COUNTY.

This county, which receives its name from the Merced river, flowing westerly through its northeastern part, is bounded on the northwest by Stanislaus, on the northeast by Mariposa, on the southeast by Fresno, and on the southwest by Monterey county. It has a longitude, measured easterly and westerly, of about sixty miles, with an average breadth of twenty-eight miles, giving it an area of 1,075,200 acres. Besides the Merced, crossing it as described, the San Joaquin river runs centrally through it, towards the north. In the southeastern corner of the county are the following creeks heading in the foot-hills to the east and flowing in a southeasterly direction, viz.: Black, Burn's, Bean, Deadman's, and Cottonwood, together with the Mariposa and Chowchilla rivers, the latter forming in part the boundary between this and Fresno county. These streams, though they all dry up in the summer, generally run full and sometimes overflow their banks during the rainy season. In everything relating to soil, agriculture, topography, tule lands and timber, the remarks made on Stanislaus county relative to these several topics will apply equally well to the county now under consideration.

This county being, so far as discovery extends, without mines or mineral deposits, except a small scope of unimportant placers in its northeastern corner, contains neither quartz mills nor canals, save a few irrigating ditches of limited dimensions. Merced is also without saw mills—there being no timber here suitable for making lumber. Neither have any manufacturing interests as yet obtained a foothold in the county, though a woolen mill was in course of erection at the Merced Falls in the early part of 1868, with every prospect of being carried to an early completion. There are three flouring mills in the county, all propelled by water, carrying six run of stone, and having a joint capacity to grind two hundred and forty barrels of flour daily—the amount made in 1866 having been seven thousand five hundred barrels. These mills cost in the aggregate about $35,000.

The population of Merced county numbers about two thousand five hundred. It contains no large towns; Snelling, the county seat and largest village, having but about two hundred and fifty inhabitants.

The following facts and figures relative to the agricultural products, amount and valuations of property in this county, are taken from the assessor's report for 1866: Amount of land enclosed, 84,550 acres; under cultivation, 13,968 acres; planted to wheat, 4,195 acres—product, 57,930 bushels; planted to barley, 9,661 acres—product, 114,750 bushels; wheat and barley planted in 1867, estimated at 4,764 acres of the former, and 8,670 of the latter; Indian corn raised in 1866, 17,345 bushels, on 534 acres; 9,715 pounds of butter, 1,340 pounds of cheese, 373,000 pounds of wool, and 2,935 of honey, were produced that year; from 100,740 vines, 10,910 gallons of wine, and 320 of brandy, were made. Though fruits of all kinds do well here, their culture has not been extensively engaged in. The following indicates the number of domestic animals in the county in 1866, viz.: horses, 3,117; mules, 235; asses, 40; sheep, 79,487; goats, 258; hogs, 12,483, and neat cattle, 30,146. The real and personal property in the county was assessed at $1,233,912.

## FRESNO COUNTY.

This county derives its name from the Fresno river, a small stream heading in the foot-hills of the Sierra Nevada, and flowing westerly through its northeastern part. The term, signifying in the Spanish, white ash, was applied to this river because of the number of these trees originally found growing on its banks. This county extends northeasterly and southwesterly a distance of one hundred and twenty miles; its average breadth being about sixty-five miles. It is bounded as follows, viz: northerly by Merced and Mariposa, easterly by Mono, southerly by Tulare, and westerly by Monterey counties.

With the exception that the whole of its eastern part rises into the high Sierra, the topography of Fresno bears a strong resemblance to that of Merced county. Nearly a third of its territory comprising the western part is extremely dry; the most of it so arid as to produce but little grass, and being, at best, fit only for sheep pasturage. Here there are no streams during the summer; the winter rains even, sometimes, fail to start the water running in the dry beds of the creeks. Springs are also very scarce, exposing stock to severe suffering in some localities during the summer. The whole of this region consists of a treeless plain, sloping gently from the foot of the Coast Range to the slough, through which the waters of Tulare lake, at high stages, flow northerly into the San Joaquin river. The soil on this plain is in some places rich and deep, while in others it is gravelly and poor, being incapable, even if it were susceptible of irrigation, of producing good crops. In the coast mountains, which separate this from the county of Monterey, there is not only more water and grass, but also a sparse growth of oak and scrubby pine timber. The several plateaus, lying between the rivers that traverse this county, are quite as badly off for water, and as barren of timber, as the section described, though generally constituting a better cattle range, owing to their greater proximity to water and better supplies of grass.

That portion of the county which is covered by the Sierra Nevada, is nearly all extremely rugged—the western face of these mountains, as well as the higher foot-hills, being cut by tremendous chasms, through which flow King's river and the San Joaquin, and their tributaries. The most of the good farming land in the county, of which there is a large area, is situated along the rivers and sloughs—the former consisting of a rich, loamy soil, and the latter mostly of tule marshes. The reclamation of these marshes, which cover an area of about twenty thousand acres, was undertaken some ten years since by a party to whom the State made liberal grants thereof, conditioned on the completion of a canal designed to effect their thorough drainage; and which, after being partially constructed, was abandoned, leaving the State still owner of these lands, and the latter remaining in their original condition. The plan proposed for their drainage was not only feasible, but of easy accomplishment; and there is little doubt but it will be carried out, at no distant day, either by the State or those with whom it may contract for the performance of the work. With a ditch, such as was projected, once finished, these grounds would never again be subject to overflow, rendering them among the most valuable lands in the world—since the green and succulent pasturage they at nearly all seasons afford, would fit them admirably for dairying purposes, while the cereals, and all the semi-tropical products, could, without resort to irrigation, be raised here in the greatest perfection and abundance. For the culture of cotton and tobacco, these tule lands, if drained, would, beyond any question, be especially well adapted.

The only streams of any magnitude in this county, consist of the San Joaquin river, which, rising by several large affluents in the Sierra Nevada, flows westerly till it reaches the middle of the great valley bearing its name, when, having received the waters discharging through the Tulare slough, it bends to the northwest and pursues its course in that direction; and King's river, a still, large stream, which, heading further south in the same range of mountains, runs southwesterly till it enters the belt of tule before mentioned, when, trending more to the south, it empties itself into Tulare lake. Having its sources in the far recesses of the Sierra, among peaks covered with perpetual snow, it carries at all times an immense volume of water; and, after reaching the plains, flows through many interlacing and tortuous channels, forming innumerable islands, sloughs and lagoons, all of the richest soil and heavily timbered, and constituting, with the broad alluvial bottoms along its banks, one of the richest and most desirable farming districts in the State. The timber growth here consists of sycamore, cottonwood, willow and oak, the latter predominating, and, being of large size, affording an abundant mast on which great numbers of swine feed and fatten, making the rearing of these animals, which is largely engaged in, a lucrative business.

While Fresno contains a great deal of excellent land, its agricultural resources, owing to its remoteness from markets, have been but very little developed. In the absence of recent authoritative data on the subject, the following rough estimates are submitted as approximately indicating the amount of its products and wealth in this department in the year 1866, to which an increase of fifteen or twenty per cent., perhaps, should be added for gains since made. Number of acres of land enclosed in 1866, 15,000; under cultivation, 4,500; to wheat, 800 acres, and to barley 1,000 acres—the former producing 9,000 and the latter 17,000 bushels. Besides this, several thousand bushels of Indian corn were raised, and a small quantity of other cereals. Although the soil and climate are well adapted to the growing of fruits and vegetables, only enough of these are raised for home consumption, the markets being too far distant to warrant their cultivation for sale.

There is a good deal of stock of nearly all kinds kept in this county, many beef cattle being raised here for market, and wool forming one of its staples of export. The value of the taxable property in 1867, exclusive of mines, was estimated at one million dollars. There are five saw-mills and one grist-mill in the county, all of moderate cost and capacity, and with the exception of one driven by water.

The population of this county numbers about three thousand. There are no towns of any magnitude in it; Millerton, the county seat and largest village, containing less than two hundred inhabitants. During the flood of January, 1868, this place was nearly all swept away—the San Joaquin river, on the bank of which it is situated, having risen at this point twenty feet higher than was ever before known, the water being at one time forty-six feet deep on the site of the town. Great damage was at the same time done nearly all over the county, in the destruction of fences, buildings, stock, etc., the land in many places also being seriously injured in having the soil covered up with sand and gravel, or in being entirely washed away.

Fort Miller, half a mile above the county seat, was, some years ago, when the Indians in this section of country were troublesome, garrisoned by several companies of soldiers. At present no troops are permanently stationed at this place, cutting off the market that before existed for many articles produced by the farmer.

Fresno City, located on the Tulare Lake slough, twenty-five miles above its junction with the San Joaquin, is a town with about half the population of Millerton, whence it is distant forty miles to the southwest. Small steamers come up to this place throughout the greater portion of the year, and there is little doubt but, keeping pace with the growth of the country, it will in time come to be a village of considerable size and importance.

The Chowchilla, Fresno, and San Joaquin rivers are all more or less auriferous, though their banks and the bars along them have never been extremely rich, nor the gold obtained of fine quality. They were, nevertheless, formerly much worked, as portions of them, more especially along the San Joaquin, are still the theatres of active operations. There are, however, no quartz mills in the county, vein mining for gold never having been attempted. Neither are there any canals for conducting water into the diggings, the miners depending on the high stages of the river for water to work their claims.

Several years since a great number of copper bearing lodes were discovered in various localities in this county. In many cases the surface ore, and in a number of instances also, that obtained at considerable depths upon these veins was extremely rich. A large amount of work in the aggregate was done, but not much applied at any one point; wherefore, the real value of these lodes remains undetermined, though the locators are generally satisfied of their permanence and richness—a few opened to the depth of a hundred feet or more, displaying in their estimation sufficient volume and wealth to warrant this conclusion.

In the extreme western part of the county, situated in the Coast Range of mountains, is the New Idria Quicksilver Mine. Having been opened some ten years ago under favorable auspices, and worked for several years thereafter with satisfactory results, this mine was closed by legal proceedings, and remained so until 1865, when work was resumed, and has since been steadily kept up upon it, the force of hands employed being between two and three hundred. The product for the year 1866 was 6,045 flasks, and for the year 1867, 11,500 flasks—the yield of the ore for the latter year having been seven per cent. of metal.

## TULARE COUNTY.

This county, deriving its name from the large lake occupying its northwestern corner, is the third in point of size in the State—only the counties of San Bernardino and San Diego being larger. It extends one hundred and thirty miles in a northwesterly and southeasterly direction, and has an average width of one hundred miles, giving it an area of eight million three hundred and twenty thousand acres. It is bounded on the north by Fresno, on the east by Inyo and San Bernardino, on the south by Los Angeles, and on the west by Santa Barbara and San Luis Obispo counties. A large portion of its surface is covered by the several chains of mountains that hem it in on three sides—the Coast Range on the west, the Sierra Nevada on the east, and the transverse group crossing its southern part and forming the connecting link between these two ranges. It thus takes the shape of a great basin, rimmed in on every side but the north, and while it does not differ widely in its topographical features from the valley counties further north, it has a hydrography essentially unlike these—all the streams flowing into Tulare lake, the common receptacle for the drainage of the county. Several of these streams are of large size—King's, the Kahweah, Tule, and Kern rivers, discharging, particularly in the summer, when the snow melts on the Sierra, immense volumes of water. That these streams, pouring into this lake such a constant tide, should not speedily so raise it as to inundate the adjacent country, has led to the suggestion that there may be a subterranean passage connecting it with the ocean through which a portion of these waters make their escape. The great expanse, however, of this lake—thirty-three miles long and twenty-two wide, and the broad area of the tule lands bordering it, which, with a slight rise above its ordinary level, are converted into immense lagoons, would seem to afford sufficient space for these waters to spread out until their volume can be reduced by evaporation—a process that goes on very rapidly in the hot and desiccated atmosphere that always prevails throughout this region in the summer.

All the streams mentioned, heading in the Sierra, flow through deep and precipitous cañons until they reach the plains, when they meander through their broad and fertile bottoms—some of them separating into several channels, forming wooded islands, after the manner described in the case of King's river. The Kahweah is thus divided up into eight or ten branches—though, when first discovered, under the supposition that there were only four of these channels, the name "Four creeks" was given to them collectively—a term which they have in that sense ever since retained, though each has now an individual name of its own. By the same appellation the country adjacent to these creeks has also come to be known.

The most of these bottoms, as well as portions of the plains lying between them, are covered with scattered oak trees of large size, and which, though they are not worth much for making lumber, are servicable for fencing, and supply an abundance of good fuel. All that part of the county lying west and southwest of the lake is destitute of timber, though the entire slope of the Sierra Nevada is covered with majestic forests of coniferous trees, even to its very summit.

About forty-six miles northeast of Visalia, and at an elevation of between six thousand and seven thousand feet, occur great numbers of "Big Trees," not standing in groups and isolated groves, as in Calaveras and Mariposa counties, but scattered throughout the forests all the way from King's river to the Kahweah, a distance of over forty miles, and perhaps much further, the area over which they extend not having been fully ascertained. From measurements made by the members of the State Geological Survey, who visited this forest, the largest tree standing, so far as they had opportunity to observe, was one hundred and six feet in circumference at the base, and two hundred and seventy-six feet high. It had, however, been partially burnt away, and was judged to have originally had a girth of between one hundred and fifteen and one hundred and twenty feet. The body of a prostrate tree has been burnt out to such an extent that it admits of a man riding into the hollow trunk for a distance of seventy-six feet, where he has room to turn his animal without difficulty. At a distance of one hundred and twenty feet from the butt, this tree is thirteen feet in diameter inside the bark. There is a large number of these trees in this neighborhood, many being, to all appearance, nearly as large as the one just described, while those varying from ten to fifteen feet in diameter are quite common.

Within the limits of this county, or standing on the line between it and Inyo, are some of the highest and wildest peaks in the Sierra Nevada. Here are the Dome mountains, 9,825 feet high, remarkable for the regularity of their outline; Mt. Williamson, still more striking and lofty; Mt. Kahweah, 14,000 feet high ; Mt. Tyndall, 14,386 feet high ; and, finally, Mt. Whitney, 15,000 feet above the level of the sea—the highest peak in this range, and, probably, the most elevated land on the continent of North America.

The population of Tulare is estimated at about six thousand, the greater portion of whom are engaged in agricultural pursuits. Visalia, the county seat, contains about one thousand inhabitants. It occupies a handsome site on one of the branches of the Kahweah river, the land being level, fertile, and covered over, for many miles around, with large oak trees. It is surrounded with gardens, orchards, vineyards, and well cultivated fields, the soil here being well adapted to the production of almost every fruit or plant grown in California, and remarkably prolific. The means for irrigation, generally necessary where the soil is light and sandy, are never failing and ample. On the heavier adobe soil crops of grain can be made, if properly put in, without this aid. Visalia contains besides its public schools, a well conducted and flourishing seminary, a handsome court-house, several halls, churches, and other public edifices, many fireproof stores, and a large number of tasty cottages and mansions, nearly all occupying large lots planted with trees, vines, and flowers. Being centrally situated, and the only town in the county of any size, it enjoys an active trade, which is every year expanding as the country around it fills up with settlers.

From the assessor's reports for 1866, it appears that the taxable property of the county was that year valued at $1,299,379 ; the amount of land enclosed was 24,939 acres ; under cultivation, 7,139 acres ; in wheat, 3,092 acres, yielding 51,581 bushels ; and 2,400 in barley, which yielded 49,642 bushels. Of these grains there were sown the following year, 3,448 acres of wheat, and 3,035 of barley. In the year 1866, 5,945 bushels of Indian corn were raised, 240 of buckwheat, and large quantities of fruits and vegetables; 7,425 pounds of butter, 4,070 of cheese, 156,650 of wool, and 7,500 of honey were produced. The county contained 7,694 horses, 287 mules, 70,152 sheep, 166 goats, 8,802 hogs, and 31,597 head of neat cattle.

This is an excellent section of country for sheep, swine and cattle raising. Owing to the heat of the climate in the summer, remoteness from market, etc., dairying is not extensively carried on—the most of the cattle raised being intended for the shambles. Wool growing, however, is increasing rapidly; while it is doubtful if swine can be raised and fattened in any other part of the State with the same facility as here. These animals being marked with the owner's brand, after the manner of sheep and cattle, are suffered to run at large in the tule swamps, where they not only grow, but soon become extremely fat, feeding on the roots of these plants and on fresh water mussels found in great quantities about the margin of the lake. Swine thus left, being thereafter little cared for, and rarely seeing human beings, soon become quite wild, making it necessary for the owner to shoot them when he wishes to secure the carcass. Cattle thrive in this region the year round without housing or fodder, being rarely ever pinched by hunger or suffering from cold.

Tulare contains two grist mills, carrying each two run of stone, and having a capacity to grind 130 barrels of flour daily; the one is driven by water, and the other by steam—their aggregate cost having been about $25,000. The flour ground in 1866 amounted to 10,250 barrels. There are three saw mills in the county, carrying five saws, and capable of cutting 20,000 feet of lumber per day.

The only mining carried on in Tulare consists of operations in quartz, the business being mostly confined to the vicinity of White river. There are four mills at this place, carrying in all twenty-five stamps, and costing in the aggregate $40,000. They have all been running with a good average degree of success; the lodes at this place, though not large or numerous, being compact, and carrying a good body of fair grade ore.

No water ditches have been constructed in the county except such as are designed for bringing water upon the land. Of this class, there are about fifty, all of limited capacity—the area of land irrigated amounting to 4,000 acres.

# CHAPTER IV.

## CLIMATE.

General Remarks--Temperature—Extremes of Heat and Cold—Winds—The Sea Breeze—Northers—Southeasters—Rains—Storms—Cloud and Mist—Snow and Hail—Thunder and Lightning—Relations of Climate to Agriculture and other Pursuits—Health, Domestic Economy, etc.

In this outline of the climate of California minute details and the scientific investigation of causes are avoided, and a practical view of the subject is presented to the reader, with especial relation to the capacities of the country, and the comforts and industries of the people.

The climate of California is too much varied to be considered as a whole. It might be regarded almost as a heterogeneous mixture of the tropical and the arctic. From the Capital city, under the noonday sun of the summer solstice, with a temperature of from 90 to 100°, exceeding the extreme summer heat of the Atlantic States, you will see the snows glistening on the Sierras at no great distance. And by taking the cars on the trans-continental railroad, a few hours of travel will transport you to an arctic landscape. On the other hand, embarking on the steamer for San Francisco, at two o'clock in the afternoon, and travelling in the opposite direction, before night you are shivering in the cold sea breeze which sweeps up the bay.

It is not necessary to journey so far in order to experience the same transition. You have only to cross any of the mountain walls which separate the ocean and bay from the interior, and which dam out the cold ocean atmosphere.

There are essentially two climates in California, the land climate and the sea climate. The latter derives its low temperature from the ocean, the water of which, along the coast, stands at from 52° to 54°, all the year round. The evenness of the ocean temperature is owing to a steady current from the north, which is accompanied also by winds in the same direction during the entire summer season, or rather from April to October inclusive. Almost daily, during this period, a deluge of cold, damp air, of the same temperature as the ocean over which it has passed, is poured upon the land. It is mostly laden with mist, in dense clouds, which it deposits at the foot-hills and on the slopes of the highlands, or carries a short distance into the interior wherever there is a break in the land-wall.

The land climate is as nearly as possible the opposite in every respect. In summer and autumn it is hot and dry. It undergoes various modifications from the configuration of the surface of the earth. Even the mountains, which retain the snow till a late period, present a high temperature in the middle of the day ; and the presence of snow on their summits in June is owing to the great mass which has accumulated on them, rather than to cold weather.

A large district of territory lies between the jurisdiction of the two climates, and subject to their joint influence. It is composed chiefly of valleys surrounding the bay of San Francisco, and penetrating into the interior in every direction. There is no climate in the world more delightful than these valleys enjoy, and no territory more productive. Whilst the ocean prevents the contiguous land from being scorched in summer, it also prevents it from being frozen in winter. Hence, ice and snow are not common in the ocean climate. The difference in temperature is comparatively slight between summer and winter.

The cold of winter in the interior is not intense, even on mountain elevations, with the exception of the tier of counties in the extreme north. Its degree depends much, however, on the altitude of the locality. The severity of winter is due, not to extreme cold, in any part of California, but to violent and prolonged snow storms in one section, and cold and prolonged rains in others.

It is interesting to cast the eye over the map of the State, and trace out climatic modifications as governed by topography. First, look at the long range of coast, the slope of which, as far back as the first mountain wall, is under the control of the ocean, and has the most uniform of climates. It is a narrow strip of territory, the only part of the State preserved from desiccation in summer by daily showers of mist, and, therefore, admirably adapted to dairy purposes. Then survey the counties bordering on the great bay—Sonoma, Napa, Solano, Contra Costa, Alameda, Santa Clara and San Mateo, borrowing one half their climate from the ocean and the other half from the interior; inexhaustible in agricultural resources, and forming the granary of the Pacific. The Pajaro and some other valleys farther south, to which the sea winds gain access, belong to the same system; and those also of the Sacramento and San Joaquin, although in a lesser degree, being farther removed from the ocean. Then regard the mountain region, with its countless little valleys, buried up with snow in winter, bursting forth into a paradise with the spring, and converted into furnaces by the summer's sun, and yet luxuriant with all kinds of delicious fruits. In this section are concentrated the mining interests. Finally, view the southern section, embracing one fourth of the State, removed alike from both extremes which operate in the north, controlled neither by mountain nor ocean, and enjoying the most genial temperature—a section of country wanting only in the certainty of winter rains to make it an Eden.

After these general remarks, let us proceed to a more definite view of the subject, taking the climate of San Francisco as a stand-point and basis of comparison. This is proper, not only because the metropolis is the center of population, containing one fourth the inhabitants of the State, but because its climate is a type of that of the coast and bay regions. We will first consider the temperature.

### TEMPERATURE—EXTREMES OF HEAT AND COLD.

The record of the climate of San Francisco, as kept by Dr. Henry Gibbons, extending from the autumn of 1850 to January, 1868, a period of seventeen years, shows the coldest weather during that time to have occurred in January, 1854, when the mercury fell as low as 25°. The coldest noonday for the same period was 37°. Persons who do not rise early may see no ice in that city for several years in succession. When it is cold enough to preserve ice in the shade all day the circumstance is noted as a phenomenon. It is not uncommon for the entire winter to pass away without bringing the thermometer down so low as the point of freezing. In the year 1853 it fell at no time lower than 40°, or eight degrees above the freezing point.

The extreme of heat in the same period occurred on September 10th and 11th, 1852, when the thermometer reached 97° and 98° on the two days respectively. This, however, was entirely exceptional, and might not again occur in half a century. The air was dry as a sirocco, and had a curious effect on the wood-work of houses, causing a constant crackling noise, from the shrinking of the timber, and the plaster breaking on the wooden partitions. In a locality somewhat exposed to reflected heat from the sun, and where the temperature was 100°, a thermometer with a wet bulb fell to 68°—the evaporation reducing it thirty-two degrees.

With the exception just noted, the hottest day in the seventeen years was on the 6th of July, 1867, when the thermometer stood at 93°. In October, 1864, and in September, 1865, it reached 91°; and in July, 1855, it rose once to 90°. Thus, it appears there were but six days in seventeen years when the temperature was as high as 90°, and only two of these six days were in the summer months.

The absence of warm weather in the summer months is characteristic of the coast climate and strikes a stranger forcibly. The most ordinary programme of this climate for the year is as follows, beginning with the rainy season : The first decided rains are in November or December, when the country, after having been parched with drought, puts on the garb of spring. In January the rains abate and vegetation advances slowly, with occasional slight frosts. February is spring-like, with but little rain. March and April are pleasant and showery, with an occasional hot day. In May the sea breeze begins, but does not give much annoyance. In June, just as warm weather is about to set in, the sea breeze comes daily, and keeps down the temperature. It continues through July and August, occasionally holding up for a day or two, and permitting the sun to heat the air to the sweating point. In September the sea wind moderates and there is a slight taste of summer, which is prolonged into the next month. The pleasant weather often lingers in the lap of winter, and is interrupted only by the rains of November or December.

By running the eye over the following table, a general idea can be gained of the coast climate as regards temperature. The first column represents the average temperature of each month at sunrise, for seventeen years; the second, at noon ; and the third, is the mean of the other two.

| Months. | Mean at Sunrise. | Mean at Noon. | Monthly Mean. |
|---|---|---|---|
| January | 44.° | 56.° | 50.° |
| February | 47. | 60. | 53.5 |
| March | 48. | 63. | 55.5 |
| April | 49. | 65. | 57. |
| May | 50. | 64. | 57. |
| June | 51. | 68. | 59.5 |
| July | 52. | 67. | 59.5 |
| August | 53. | 67. | 60. |
| September | 53.5 | 69.5 | 61. |
| October | 53. | 68. | 60.5 |
| November | 49. | 62. | 55.5 |
| December | 45. | 55. | 50. |
| Yearly mean | 49.5 | 63.7 | 56.6 |

Observe, in the table, the regular increase from January to September, and the rapid decrease from October to December; nine months of increase and two of decrease. Notice, also, the uniform increase of the night temperature as represented in the first column, and the irregularity in the noonday increase, the sea breeze arresting it in May, and the sun giving it an upward impulse in June, before the sea wind has gained undisputed control.

Whilst the summer months are warmest in the interior, as in most countries, a very different arrangement exists in the coast climate. This is because the sun has entire control inland, within its mountain intrenchments, and the ocean almost entire control of the coast slope outside of those intrenchments. The two forces act inversely; that is to say, the more powerful the sun's heat in the interior, the more powerful is the pressure and force of the cold ocean atmosphere without. The heating power of the sun in the interior begins to decline after midsummer, and the temperature then begins to fall. But this lessens the draught from outside and gives the sun greater calorific power over the exterior atmosphere. Accordingly, with the diminution of the force of the sea breeze in September, comes a slight touch of summer along the coast. The sun, not having receded far from the tropic of Cancer, avails itself of every opportunity to warm up the coast, and gains a temporary triumph over the ocean in September, or sometimes not till October. Hence, as the table shows, September is the warmest month in the year, and October next; then comes August; July, the hottest month almost everywhere else, is the fourth here, or ranks as such in connection with June; next come April and May; then March and November; then February, and finally January and December, the only winter months.

The mean annual temperature at San Francisco is 56.6, which may be set down as the mean of the coast and bay climate. As we recede from the ocean, the days are warmer and the nights colder, the sun being the great disturber of temperature, and the ocean the great equalizer. But the increase of the day corresponds so nearly with the diminution of the night temperature, that the mean varies but little within the range of the sea breeze.

Washington and Richmond, nearly in the same latitude as San Francisco, have a mean of 54 or 54½, two degrees colder than the latter. This appears, at first sight, to be a small difference; but its value is made evident by reflecting that it is a difference for every day in the year—each day of the year in San Francisco, from January to December, having an average of two degrees higher than the corresponding day on the Atlantic border. Cold as our summers are in proportion to those in the East, it appears that the winters are warmer, in still greater proportion.

In the Atlantic States the mean annual temperature diminishes in going northward about one degree for every degree of latitude. This is the general rule in all climates. But the climate of California presents an extraordinary anomaly in this respect. Along the coast, from the mouth of the Columbia river to Monterey, a range of nine degrees of latitude, the mean temperature varies but little—not more than three or four degrees at most; and even this difference does not correspond exactly with the difference of latitude. On the other hand, the interior climate varies indefinitely, every valley having a climate of its own. The summers, however, are generally hotter in the north. One might start from Los Angeles, near the south line of the State, in summer, and travel northward, inland, five or six hundred miles, and find it growing hotter every day; and he might go in a southeasterly course less than half that distance, and arriving at Fort Yuma, on the Colorado, he would find one of the hottest places in the world.

The sudden fluctuations of temperature, incident to the climate of the Atlantic States, are unknown in California. We have none of those angry outbreaks from the northwest, which change summer to winter in a few hours. The sea breeze is chilling enough, especially when it comes in suddenly to reassert its sway, after one of the occasional warm days of summer; but the sea breeze can never bring the thermometer below 52°.

In the summer months there is scarcely any fall of temperature through the night in the coast climate. The early morning is sometimes clear, sometimes cloudy, but always calm. A windy morning in summer is uncommon at San Francisco. A few hours after sunrise the clouds break away and vanish, and the sun shines forth cheerfully and delightfully; not a breath of air is stirring. Towards noon, or a little after, the sea breeze sets in, and the weather is completely changed. From 65° the mercury drops to 53° or 54° long before sunset, and at that point it remains almost motionless till the next morning. This is the order of things in three days out of four in June, July and August.

In the climate of the coast the nights are never uncomfortably warm. The extreme heat at 10 P. M. at San Francisco, for seventeen years, was 76°. The thermometer reached this point on three different nights; on two nights it reach 75°, on four nights 73°, on two nights 72°, and on five nights 70°—making only sixteen evenings in seventeen years when it was warm enough at bed-time to sit out of doors with thin clothing. The warmest morning in seventeen years was 69°. These facts have special interest in relation to sleep.

Though the nights in the interior are not so uniformly cool, yet there are few localities, even in the valleys, where they are too warm for sleeping, even though the day temperature may have reached 100°. This is a remarkable feature of the climate of the Pacific States, and it has an important bearing on the health, vigor, and character of the population.

In the southeastern corner of the State is a section having a climate of its own. It is known as the Colorado desert, and is comparatively barren of vegetation, owing to the small quantity of rain which falls there. The mean temperature at Fort Yuma, though not exactly in the desert, is, in the month of July, upwards of 100° at noon, and 90° at 9 P. M. In contrast with this, is the winter climate of Yreka, near the extreme northwest corner of the State, and representing a small alpine section bordering on Oregon. During the stormy weather of January, 1868, when the thermometer at Marysville and other localities in the north was telegraphed as ranging from 25° to 35°, at 8 A. M., the dispatches from Yreka placed it below zero day after day, and sometimes 10° or 12° below.

We will conclude the subject of temperature with a table, representing the mean of the several seasons at a number of prominent points in California, and also farther northward. The first column gives the temperature of the spring months, March, April and May; and so on, the other seasons are arranged. The last column is the mean annual temperature.

| Localities. | Spring. | Summer. | Autumn. | Winter. | Year. |
|---|---|---|---|---|---|
| San Francisco | °<br>56.5 | °<br>60.0 | °<br>59.0 | °<br>51.0 | °<br>56.6 |
| Sacramento | 56.0 | 69.5 | 61.0 | 46.5 | 58.0 |
| Benicia | 56.5 | 67.0 | 60.5 | 49.0 | 58.0 |
| Monterey* | 54.0 | 59.0 | 57.0 | 51.0 | 55.5 |
| San Diego | 60.0 | 71.0 | 64.5 | 52.5 | 62.0 |
| Fort Yuma | 72.0 | 90.0 | 75.5 | 57.0 | 73.5 |
| Humboldt Bay* | 52.0 | 57.5 | 53.0 | 43.5 | 51.5 |
| Port Orford | 52.0 | 60.0 | 55.0 | 47.5 | 53.5 |
| Dalles, Oregon | 53.0 | 70.5 | 52.0 | 35.5 | 53.0 |
| Astoria, Oregon | 51.0 | 61.5 | 54.0 | 42.5 | 52.0 |
| Fort Steilacoom, Washington Ter. | 49.0 | 63.0 | 51.5 | 39.5 | 51.0 |

There is this difference between the summer in the interior of California and the Atlantic States—that in the former, it is unbroken by the showers and storms which in other regions temper the heat and give variety to the climate. From the beginning of June until November the sky is mostly unclouded, and the sun shines out brightly the whole day.

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* The figures for these localities are probably too low.

### WINDS: THE SEA BREEZE—NORTHERS—SOUTHEASTERS.

Throughout the entire year, with the exception of the two months, December and January, the prevailing winds of the coast climate are from the west. Even in those two months, the west wind is often predominant. In the winter and spring it is frequently accompanied with showers, but never in the summer and autumn. The true "sea breeze," the great refrigerator of this coast, is free from rain. It is commonly free from mist till June or July. It begins in February, and for about one half of that month comes in gently towards sunset. In March and April it is more frequent and sometimes strong. Its frequency and force increase in May, and in June it is turbulent and seldom absent. In July it reaches its acme of force. In August it is constant, but not quite so violent. In September it is also constant, but much diminished in force. In October it is lighter, and interrupted. In November it is irregular, and it disappears as December approaches.

It might be said that there are no east winds in California. The lofty mountain ranges to the eastward prevent any general current from that quarter. While the duration of the west wind, coming from one eighth of the compass, is upwards of two hundred days in the year at San Francisco, that from the east octant is not over two days. The remaining portion of the year is divided between dry northerly and damp, cloud-bearing southerly winds. Thus, the winds of California appear to belong to three systems:

1. The sea breeze, dependant on inland heat and ocean cold. Though loaded with vapor, it mixes with the warm, dry air of the land, and can produce no rain—the land air drinking up its moisture.

2. The land winds, from the north, which sweep through the entire State in the winter, and are confined to the interior in summer. They are cold in winter and hot in summer, but always dry. Occasionally they come like a sirocco and burn up vegetation. Fruit is sometimes roasted on the trees by the combined influence of the sun and wind. Along the coast the north wind is modified materially by mingling with the ocean air.

3. The south winds, which are warm, and come from the ocean loaded with moisture. They belong to the climate of winter and spring. Coming along the coast line, their direction is modified by the mountain ranges, and they become southeast winds; or by the pressure of the ocean air, making them southwest winds. Mixing with the colder atmosphere as they travel northward, cloud and rain are the result. They are the storm winds of winter, often doing much damage to shipping in the harbor, and prostrating trees in great numbers in the mountains.

The sea breeze, besides controlling the climate of the coast and bay region during nearly the whole year, modifies very much the summer climate of the interior. Wherever there is a depression in the highlands of the coast, it pours in and spreads itself over the heated earth. At the Golden Gate it has a fair sweep, and enters with great force, striking the opposite shore of Alameda county, where its further progress is interrupted by the hills. It is then deflected northward and southward, and following the course of the bay, at San José becomes a northwest, and at Benicia a southwest wind. It continues its course, spreading like a fan into all the valleys that open towards the bay. At points most remote from the inlet, it arrives late in the day. Chilling and unwelcome as it is to the inhabitants of the metropolis, its afternoon visit is hailed as a blessing by those suffering from the sweltering heat of the interior. Within the range of the sea breeze the trees indicate its course, by leaning in the direction towards which it blows. Around the bay, where the winds are strong, the trees sometimes lean so as to rest their branches on the ground; or the branches grow out only on the lee side, giving the tree the appearance of having been cut down through the center—the windward half being removed. Far inland, on the Sacramento river for instance, where the current of air is always gentle, the trunks of the trees incline slightly to the north. In such localities the tree is bent, not by the violence of the wind, but by its constancy, the young branches being always pressed in the one direction during the growing season.

The sea breeze, though often very strong, is never violent enough to do any serious damage ; its force is limited. The norther, which is most apt to occur as a prelude to winter, is not sufficiently strong to do much mischief on land, though from its direction, sweeping the harbor, its effect upon the shipping is sometimes disastrous. If the sea breeze had the same direction, the harbor could scarcely be used in the summer months. The storm-wind of winter, varying from southeast to southwest, is often more violent than either ; it is the only wind that ever unroofs buildings in the city, a result that may happen once in ten or fifteen years.

Each of these winds has its time of day, so to speak. The sea breeze is invariably at its height at 2 or 3 P. M.; it subsides by sunset or sooner. The southerly storm-wind is apt to rise in the evening and reach its height about 2 or 3 A. M.; it is not, however, very regular in its habits. The norther springs up in the night, is generally at its height early in the morning, and subsides about noon.

Apart from the sea breeze, there is much less wind in California than in the Atlantic States. At San Francisco, and in the ocean climate generally, the wind is not high on more than three or four days in the five months from October to February, the calmest months in the year being November, December and January.

## RAIN, STORM, CLOUD AND MIST.

Mining and agriculture, the leading interests of California, are intimately connected with the distribution of rain. Drought on the one hand and flood on the other, are the terrors of a large portion of the people. For these and other reasons, it is proper to dwell at some length on the subject of rain.

In the entire absence of rain during one portion of the year, and its restriction to another portion, California has but one climate. There is this difference, however, between one part and another, that the rain commences sooner and continues later in the north, and that both the quantity of rain and the duration of the rainy season diminish on approaching the southern part of the State, or rather on receding from the mountainous section.

The rain-year of California does not conform to the calendar year, but extends from summer to summer, embracing the latter part of one year and the former part of the year ensuing. The natural division is in July or August—say the first of August. The calendar year fails to represent properly either a dry winter or a rainy one. Thus, the smallest quantity of rain in any one of the seventeen calendar years was 10.50 inches, in 1865, while the climatic year 1850-51 had but 7.12 inches, and 1863-64, 8.49 inches. On the other hand, the calendar year 1865 had but 10.50 inches, or half the average supply, from which it would be inferred that one at least of the two seasons in which it enters was dry. Whereas, by reference to the table, it appears that both of those seasons had the full supply, being a fraction over twenty-one inches. It so transpired that the rain of one season was mainly in the latter part of 1864, and that of the latter season in the early part of 1866, leaving the intervening calendar year deficient.

In seasons of scanty rains, the deficiency is not confined to certain districts, as in the Atlantic States, but it is general. The annual supply, however, varies greatly in different sections. Taking the guage at San Francisco as a basis, very nearly the same quantity falls in the valleys surrounding the bay, and also in the Sacramento valley as far north as the Capital. Speaking more precisely, the quantity in Sonoma and Napa counties is rather greater, and in Santa Clara, south of the bay, rather less than at San Francisco. Proceeding southward it diminishes rapidly, the rain fall at Los Angeles and San Diego being only one half that of the bay. In the north and northeast, among the Sierras, it is three or four times as much in some localities.

The following table exhibits the rains of each month at San Francisco, for seventeen years, beginning with the winter of 1850–51, and the mean for each month of the year:

| Year. | Jan. | Feb. | Mar. | Ap'l. | May. | June | July | Aug. | Sept | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1850.......... | ..... | ..... | ..... | ..... | ..... | .... | .... | .... | .... | ..... | 1.25 | 1.15 |
| 1851.......... | .65 | .35 | 1.88 | 1.14 | .69 | .... | .... | .02 | 1.00 | .18 | 2.14 | 7.07 |
| 1852.......... | .58 | .12 | 6.49 | .19 | .30 | .... | .... | .... | .... | .80 | 5.31 | 11.90 |
| 1853.......... | 4.11 | 1.16 | 4.81 | 5.05 | .32 | .... | .... | .... | .... | .10 | 1.43 | 2.05 |
| 1854.......... | 4.27 | 8.41 | 3.17 | 3.31 | .02 | .04 | .... | .... | .... | 2.12 | .40 | .38 |
| 1855.......... | 4.52 | 4.61 | 4.31 | 5.59 | 2.14 | .... | .... | .... | .... | ..... | 1.15 | 5.45 |
| 1856.......... | 8.44 | .43 | 1.64 | 3.14 | .88 | .... | .... | .... | .08 | .50 | 2.90 | 4.00 |
| 1857.......... | 2.07 | 8.66 | 1.56 | .00 | .01 | .14 | .... | .... | .... | .93 | 3.01 | 4.14 |
| 1858.......... | 4.36 | 1.32 | 3.94 | 1.14 | .11 | .10 | .... | .04 | .... | 3.35 | .48 | 4.77 |
| 1859.......... | 1.00 | 5.22 | 2.51 | .33 | 2.03 | .... | .... | .... | .... | ..... | 5.43 | 1.51 |
| 1860.......... | 1.13 | 1.36 | 3.06 | 1.72 | 2.56 | .... | .33 | .... | .02 | .96 | .22 | 4.79 |
| 1861.......... | 1.21 | 2.83 | 3.40 | .26 | .66 | .16 | .... | .... | .... | ..... | 3.78 | 6.10 |
| 1862.......... | 18.14 | 6.11 | 1.66 | 1.11 | .91 | .23 | .... | .02 | .... | ..... | .14 | 2.73 |
| 1863.......... | 3.29 | 3.26 | 2.42 | 2.92 | .41 | .... | .... | .... | .15 | ..... | 2.50 | 1.73 |
| 1864.......... | 1.31 | .00 | 1.39 | .93 | .52 | .... | .... | .17 | .02 | .02 | 7.62 | 6.97 |
| 1865.......... | 3.97 | .78 | .60 | .73 | .42 | .... | .... | .... | .25 | .14 | 3.06 | .55 |
| 1866.......... | 11.05 | 1.47 | 2.55 | .12 | 1.85 | .15 | .... | .... | .... | ..... | 2.64 | 13.15 |
| 1867.......... | 6.64 | 6.22 | 1.68 | 1.85 | .04 | .... | .... | ... | .06 | .56 | 3.10 | 12.85 |
| Mean..... | 4.51 | 3.08 | 2.76 | 1.74 | .82 | .05 | .02 | .01 | .09 | .57 | 2.74 | 5.37 |

The greatest quantity of rain for any one month, as the table shows, was 18.14 inches, in January, 1862—a winter memorable on account of destructive floods on the Pacific slope. The greatest quantity in any one month in Eastern Pennsylvania, during a period of thirty years, was thirteen inches; and this was in one of the summer months. So much as this never falls in a winter month in the Atlantic States. For one season of excessive drought there have been two of excessive rain. No two seasons in succession have given as much rain as 1866–67, and 1867–68.

The rains of each season are exhibited in the following table, in juxtaposition with the rains of each year :

| Season. | Rain. | Year. | Rain. |
|---|---|---|---|
| 1850-51 | 7.12 | 1851 | 15.12 |
| 1851-52 | 18.00 | 1852 | 25.60 |
| 1852-53 | 33.46 | 1853 | 19.03 |
| 1853-54 | 22.80 | 1854 | 22.12 |
| 1854-55 | 24.10 | 1855 | 27.80 |
| 1855-56 | 21.13 | 1856 | 22.01 |
| 1856-57 | 19.95 | 1857 | 20.55 |
| 1857-58 | 19.05 | 1858 | 19.64 |
| 1858-59 | 19.76 | 1859 | 18.03 |
| 1859-60 | 17.10 | 1860 | 16.15 |
| 1860-61 | 14.54 | 1861 | 18.43 |
| 1861-62 | 38.04 | 1862 | 31.05 |
| 1862-63 | 15.19 | 1863 | 16.68 |
| 1863-64 | 8.49 | 1864 | 18.95 |
| 1864-65 | 21.30 | 1865 | 10.50 |
| 1865-66 | 21.19 | 1866 | 32.98 |
| 1866-67 | 32.22 | 1867 | 33.00 |
| Mean | 20.79 | Mean | 21.62 |

It appears that December is the month of greatest rain. The rainy tendency reaches its climax about Christmas, and then diminishes gradually until the termination of the season of rain, towards the latter end of May. June, July, August and September are dry, with exceptions so slight as scarcely to deserve notice, only 2.50 inches having fallen in these four months collectively in seventeen years.

In almost every winter there are two rainy periods, with a drier period interposed, showing an analogy to the earlier and later rains of Palestine and other oriental countries. The month of February is the most frequent representative of the dry period. But the spring rains, which sometimes commence in this month, and other heavy rains which occasionally fall, swell the aggregate so as to prevent the exhibition of a deficiency in the table.

In speaking of the "rainy season," strangers will not infer that rain is perpetual, or nearly so, during that time. The term is employed only in contrast with the dry season, and it implies the possibility rather than the actual occurrence of rain. In more than half the winters there is not a drop beyond the necessities of agriculture, and even in the seasons of most rain much very pleasant weather is interspersed. If the winter be not extraordinary, it is generally regarded as the most pleasant season of the year. In the intervals of rain it is bright, sunny and calm. It is spring rather than winter. The grass starts as soon as the soil is wet. At Christmas, nature wears her green uniform almost throughout the entire State, and in February and March it is set with floral jewels. The blossoms increase in variety and profusion until April, when they are so abundant in many places as to show distinctly the yellow carpeting on hills five miles distant.

There is great irregularity in the time of the commencement of the rainy season. It never sets in before November, and sometimes not till the latter part of December. In the northern section the rains commence earlier than at San Francisco, and in the southern section later. The spring rains, which are of immense importance to agriculture, rarely fail. March is one of the surest months in this respect. April often gives a copious supply. There is a remarkable tendency to rain about the 20th of May, and a complete cessation soon afterwards. It is a striking feature of the climate, that when the weather puts on its rainy habit, the rain is apt to continue every day for one or two weeks, and then an interval may ensue without a drop for several weeks.

The rains of California are tropical in one respect, being showery, and not often regularly continuous for many hours. The monotony of an easterly storm, such as the Atlantic climate furnishes, is almost unknown here. The sun breaks forth frequently in the midst of a shower, and directly the sky is almost clear. Presently, when it is least expected, the rain is heard on the roof with the suddenness of a shower-bath.

The night is more favorable to rain than the day. No matter how dense the clouds, how fair the wind, how resolute the barometer in its promise of falling weather, the sun rarely fails to break up the arrangement before noon, and to tumble the clouds into confused masses, or dissipate them altogether. But before night, or during the night, the clouds resume their function.

The prevailing direction of the cloud-current is from south to west, and the cloud supplying the rain is mostly of the cumulo-stratus or nimbus form, and quite low in the sky. What is singular, the rain begins most frequently to the northward, although the cloud comes from the south. The horizon in the south may be entirely clear under these circumstances, the cloud forming in view, and growing denser and denser in its northward travel, until it precipitates the rain.

The following table exhibits the mean quantity of rain falling at different stations, and the number of years on which the mean is computed. The stations are arranged in the order of their latitude, beginning with Fort Yuma and San Diego, which are about on the same parallel:

| Localities. | Term. | Mean. |
|---|---|---|
| Fort Yuma | Four years | 3.24 |
| San Diego | Three years | 10.43 |
| Monterey | Four years | 12.20 |
| Stockton | Four years | 15.10 |
| San Francisco | Seventeen years | 20.79 |
| Benicia | Eight years | 22.86 |
| Sacramento | Twelve years | 18.23 |
| Placerville | 1861-62 | 86.00 |
| Placerville | 1862-63 | 26.00 |
| South Yuba | 1861-62 | 109.00 |
| South Yuba | 1866-67 | 81.56 |
| Red Dog, Nevada County | Three years | 64.00 |
| Fort Jones | Three years | 16.77 |
| Hoopa Valley, Klamath Co. | 1861-62 | 129.15 |
| Port Orford | Four years | 71.63 |
| Astoria, Oregon | One and a half years | 86.35 |
| Dalles, Oregon | Two years | 14.32 |
| Fort Steilacoom, Washington Ter. | Five years | 61.75 |

A comparison with the Atlantic slope presents a striking contrast. The smallest amount of rain that falls in one year, in any locality on the eastern side, say twenty inches, is at least equal to the average annual supply in the great grain-growing valleys of California; whilst, on the other hand, no locality on the eastern side, until you reach the tropical latitude of Florida, approaches the maximum of the Pacific slope. Thus, California, with a range of ten degrees of latitude, has a minimum of three and one-quarter inches at Fort Yuma, with a maximum exceeding one hundred inches on the Sierras; whilst the Atlantic slope, with upwards of twenty degrees of latitude, and an expanse of territory vastly greater, with mountainous elevations of considerable height, presents a minimum of twenty inches with the same maximum as California.

To make the contrast more striking, it may be added that the annual supply of rain has a greater range in California, in a distance of fifty miles from Sacramento City, than on the Atlantic slope, from Maine to Florida. Two or three times as much rain may fall in a single night in the mountains of California, as in the entire year in the southeastern corner of the State.

The enormous quantity of one hundred and twenty-nine inches, at Hoopa valley, is stated on the authority of Dr. Kirkpatrick, of the United States Army. In general, such extreme results are to be accepted with caution. The gauge may not have been fairly exposed—or it may have been wrongly graduated. But Dr. Kirkpatrick gives, in detail, the supply for each of three months, which seems to confirm his report: November, 44.10 inches; December, 23.79 inches; January, 30.95 inches. An observer on the South Yuba, Nevada county, reports 41.95 inches as falling there in the month of December, 1867. Instead of being surprised at the floods in the Sacramento valley, we may wonder what becomes of so much water.

It is worthy of note, that Hoopa valley is but about forty miles west of Fort Jones, where the annual supply is set down as 16.77 inches. Both places are on the northern border of the State, among the coast mountains, and remote from the ocean.

## SNOW AND HAIL—LIGHTNING AND THUNDER—AURORA BOREALIS.

There are no snow storms worthy of the name in the bay region, or in the great valleys of the State. Hail falls frequently in some seasons, mingled with rain showers—that is to say, it falls three or four times during the winter, in which case the winter is pronounced a hard one. Three or four times in eighteen years there has been enough to cover the ground, so that in favorable spots it would remain an hour or two. Once or twice in the same period the southern and middle sections of the State have been covered with snow. On the 29th of December, 1856, it snowed very fast for several hours, and two or three inches collected on the ground at San Francisco. It melted, however, before night. On the hills surrounding the bay it remained nearly a week. Early on the morning of the 12th of January, 1868, it snowed very fast for an hour or two, so that two inches collected. But it disappeared before sunrise, and was therefore invisible to the citizens generally.

The winter seldom passes without exhibiting the summits of Monte Diablo and the Coast Range, as seen from the metropolis, covered with snow. In the most severe winters it may remain there two or three weeks at a time, but this seldom happens. When it rains at San Francisco with the temperature below 50°, it snows generally on those mountains.

But, in this region of contrasts, while snow is a phenomenon in the central valleys, it accumulates in enormous quantities in the mountainous counties of the north and east. The stories that are told of its depth in some localities are almost incredible—not on the Alpine heights, in the region of perpetual snow, for there is perpetual snow only in a few places in California—but in mining regions and mountain valleys, inhabited by a dense population, and producing a luxuriant growth of vegetation in the summer. We have been assured that forty feet accumulated in one locality, in the winter of 1866–7, as measured on the trunks of trees. When we reflect that one inch of rain is equivalent to nine inches of light snow, or six of packed snow, and that forty inches of rain are recorded as having fallen in a month, we can perceive where so much snow might come from. It is stated that sixty inches of water fell during the winter of 1867–8, on the South Yuba, prior to the 1st of January. In the form of snow, counting six inches for one, this would have measured thirty-six feet.

While the absence of frost and snow in the agricultural regions favors the culture of the soil, and enables it to be carried on without interruption, except from deficiency or excess of rain, the accumulation of snow on the mountains is equally favorable to mining purposes, furnishing a copious supply of water far into the dry season. In May and June, when the great valleys are beginning to feel the parching effects of an unclouded sun, the rivers which traverse them bring down an annual freshet of ice water as the proceeds of the wintry deposit.

The comparative absence of thunder and lightning may be deemed a remarkable phenomenon of the climate of California. Three or four times in the course of the rainy season an occasional flash of lightning or peal of thunder may accompany the rains. But persons within doors may pass the whole year, or even several years, without noticing either. A regular thunder gust, such as marks the Atlantic climate and breaks the monotony of solar rule, is almost unheard of in California, unless it be in the extreme north, bordering on Oregon. Two thunder gusts are on record in San Francisco, both occurring in December, in connection with cold winter rains. Such electrical displays are confined mainly to the winter; though, on rare occasions, they take place during the summer months, more particularly in the interior.

There being so little necessity for lightning rods they are unknown in California, but the lightning does sometimes strike, nevertheless. In August, 1862, a thunder storm passed over the southern portion of Alameda county, attacking the telegraph in its route and shivering two or three of the poles. In December, 1864, the court house at Monterey was struck by lightning and somewhat damaged. In the mountains thunder storms occur occasionally, but seldom even there.

It is a common remark that the atmosphere of the Pacific coast is deficient in electricity, which means simply that the electric equilibrium is not easily disturbed. Those little exhibitions of what might be called *domestic* electricity, which are common in the Atlantic States, such as the crackling of clothing and furs, are seldom witnessed here. They are rare even in winter, though the air be thoroughly dried by a north wind. It is well known that sudden changes of temperature, and rapid formation of cloud, are favorable to electric disturbances. In the Bay climate, the few hot days that sometimes steal in with a land wind during the summer months, are followed by an immense deluge of cold, ocean air, which depresses the thermometer from 85° to 55° in a few hours, and determines the sudden production of immense volumes of cloud. But all this is performed without visible electrical disturbance. In the rainy season, clouds are formed above the horizon, in full view, with great rapidity, giving rise to sudden showers. The quickness with which this occurs is surprising. The aurora borealis is also rare, having been observed only about six or eight times in eighteen years. The extraordinary display of August 28th, and September 1st, 1859, appears to have been as brilliant on the Pacific as on the Atlantic coast.

## RELATION OF CLIMATE TO AGRICULTURE AND OTHER PURSUITS.

A stranger observing the long dry season of California for the first time, would naturally infer that this country is no place for agriculture. So firmly were the early American settlers impressed with this belief, that they made little effort at tilling the land, even to the extent of raising garden vegetables. The pliancy and ingenuity of our people, however, soon adapted them to the novel circumstances to which they were subjected. That the hills everywhere produced spontaneously from year to year a luxuriant crop of oats, and that the valleys, burnt up as they were in summer and autumn, were sure to be transformed into flower gardens in the spring, convinced them that farming could be made profitable as well as mining. While the masses were delving in the mountains in pursuit of gold, a few turned their attention to the growing of potatoes and vegetables, whereby many of them realized fortunes in a few years.

In the dryest seasons there is rain enough to produce abundant crops, if it be properly distributed. No one who has not reflected on the subject would think it possible that six inches of rain during the season could suffice. One half this quantity is enough to wet the ground for plowing, and the other half to perfect the crop. The dryest season since 1848 was that of 1850–51, when a small fraction over seven inches fell from summer to summer. And, yet, the potatoes of 1851 were not only the best ever raised in the country, but they were of extraordinary size. The principal portion of the rain was in March and April; and this furnished the opportunity to plant under favorable circumstances.

The art of farming in California, as governed by the climate, consists in having the soil in good condition and planting the seed while there is moisture enough to start it. After this, rain is not so essential in some localities. The old Californians, in their rude system, avoided planting till the rains were over. This was to escape the necessity of cultivating the crop. They have been known to plow up their potatoes when rain came after the planting, and to replant; because this was cheaper than to keep down the weeds which the rain would start into growth. This is not precisely the American method, and yet it is truly surprising how perfectly crops of all kinds will mature without a drop of rain and without irrigation.

In Alameda county a small patch of tough, adobe soil, which had never been cultivated, was ploughed up for the first time late in May and planted with beet seed. The soil was not touched afterwards with an implement of any description. The beets grew rapidly without a drop of rain, whilst the surface dried too quickly for the weeds to start. The average size of the beets at maturity was not much short of ten pounds, and many of them were twice that size. Being compressed by the solidified soil before they had attained their full growth, the roots stretched upwards, and most of them were a foot out of the earth.

There is no compensation for the absence of rain by dews. As a general rule, the atmosphere is too dry to form much dew. Immediately on the coast, north of the bay of San Francisco more particularly, the mists which are poured in daily from the ocean are equivalent to rain, and preserve the annual vegetation in a fresh condition when the surface of the earth is parched everywhere else. The finest dairy region in the world is here. The valleys surrounding the bay are also celebrated for their dairies. But the ocean slopes of Marin county take the lead, and neither the sun of summer nor the frosts of winter smite their green pastures with death.

In the Atlantic States the storms of approaching winter put a stop to the labor of the farm, and force both man and beast into winter quarters. In California it is just the reverse. The husbandman watches the skies with impatient hope, and as soon as the rain of November or December has softened the soil, every plough is put in requisition. Nothing short of excess or deficiency of rain interferes with winter farming. The planting season continues late, extending from November to April, giving an average of nearly six months for ploughing and sowing, during which the weather is not likely to interfere with outdoor work more than in the six spring and summer months of the Eastern States.

Owing to the absence of rain, harvesting is conducted on a plan which would confuse the ideas of an Atlantic farmer. There are no showers or thunder gusts to throw down the grain, or wet the hay, or impede the reaper. The hay dries in the swath without turning. The grain remains standing in the field awaiting the reaping machine, it may be, for a month after it is ready to cut. And so it remains when cut, awaiting the thresher. When threshed and sacked, the sacks are sometimes piled up in the field a long while before removal. In September and October the great grain-growing valleys may often be seen dotted over with cords of grain in sacks, as secure from damage by weather as if closely housed.

Owing to the absence of severe frosts, the gardens around San Francisco supply fresh vegetables all through the winter. New potatoes often make their appearance in March. In May the potatoes are full grown, and the largest weigh a pound or more. Though shipped and transported hundreds of miles in sacks in the winter season, no one thinks of their freezing. Frozen potatoes are unheard of, but a distinction is made in wet weather by traders, between wet and dry potatoes, accordingly as they have been exposed or not.

A peculiar effect of the climate on fruit trees, is their early and prolific bearing. Apple trees begin to bear when only two or three years old, and they also continue to grow. It is still more remarkable, that the opposite climates of the coast and the interior produce the same results in this respect. One might infer, that the dryness and heat of summer would hasten the ripening of fruits, and cause the flowering and fruiting season to be short. But the fact is precisely opposite. The blossoms, instead of coming forth all at once, continue expanding for weeks, and the fruit ripens slowly and by instalments. It follows that the market season for any kind of fruit, instead of lasting a few weeks, as in the Atlantic States, may continue for months. Cherries, for instance, begin to appear about the middle of May, and are on hand till the middle or last of July. Hence, an extraordinary variety of fruit is in market at the same time. It is probable that no market in the world is equal to that of San Francisco in this respect. Thus, strawberries, which become abundant in April, are brought to market in large quantities for three months, and then disappear, not because the production has ceased, but because people have grown tired of them, and other fruits have made their appearance. When the winter is mild, ripe strawberries may be gathered every month of the year. In favorable localities, cherries, peaches, plums, apricots, nectarines, pears, apples and figs, together with strawberries, raspberries, gooseberries and currants, may often be gathered at the same time, all ripe and in perfect condition.

For the drying of fruit the climate is admirably adapted, and the probability is that immense quantities of dried fruit will be produced in California for export. There can be no failure in the process. All that is requisite, is to expose the fruit in a suitable place, after proper preparation, and leave it there. It needs no covering or care at night, as there is not sufficient dew to harm it.

The perfection and value of fruit are greatly enhanced by the entire absence of those species of the *curculio,* which sting the fruit in the Atlantic region, and deposit the eggs from which worms are hatched. So far not a single worm of this description has been seen in any variety of fruit in California—an exemption which is no doubt due to the climate.

Other contrasts than those described in the foregoing pages result from the peculiarities of climate. In traveling through the valleys late in summer, or in the autumn, one is painfully impressed with the barrenness of the landscape. Everything is withered and desolate; the streams are all dry, and not a patch of verdure is anywhere to be seen. A few months later, should the December rains prove copious, the streams are full and the whole country is not only verdant, but many parts of it are, perhaps, under water; a most luxuriant vegetation, mixed with millions of wild flowers, everywhere greeting the eye as the spring advances.

The aridity of the dry season is a blessing in disguise. What appears to the traveler a barren waste, is a pasture field. The dried grass is well preserved, after going to seed, and both stalk and seed afford nutritious food to sheep and cattle. Here, then, is a storehouse for stock, which will endure until the first heavy rain. For this reason our agriculturists desire no rain until late in the season, and not then unless sufficient should fall to wet the soil for ploughing, or to start a fresh growth. Anything short of this only spoils the dry pasture, without giving compensation.

Another point is to be considered : that dry and dreary landscape is nature's seed store, where seeds of a hundred species are preserved for next year's use. There they repose for months as safe as if packed in the drawers of a seedsman. In the spring they will germinate by myriads. How well these seeds are preserved, is shown by the multitudes which germinate in a given space.

And now, what wonder that the hills of California are clothed every year with a luxuriant growth of wild oats? And that "volunteer" crops of barley and wheat, yielding twenty bushels to the acre, spring up in the valleys from seed scattered in harvesting? It is not unusual to have two good volunteer crops in succession, in as many years. Garden vegetables seed themselves in the same way.

By a curious arrangement, the seeds which are scattered on the ground are often secured most effectually. A large portion of the valley surface is composed of adobe soil; and as soon as the dry weather comes this soil begins to crack in all directions, and when the seed ripens and falls, it is preserved, in these natural receptacles, from the depredations of birds, squirrels and other animals.

The preservation of the pasture by drying, and the shortness of winter and consequent early production of new pasture, have tempted farmers to make little or no provision for their stock, such as is necessary in the same latitude elsewhere. There is a want in the country of barns, and of the means of housing and foddering. When there comes a severe winter, with cold rains and a long suspension of the growth of pasture, the effects are disastrous. Every such season proves fatal to vast numbers of cattle, the mere loss of which should be esteemed of less importance than the torture inflicted on them by cold and starvation. The humane farmer should not trust to the chances of a mild winter.

## HEALTH, DOMESTIC ECONOMY, ETC.

An inhabitant of New England, or Canada, coming to California, wears nearly as warm clothing in the month of July in San Francisco as he wore in January in his old home. Even then he shivers with the sea breeze, and sometimes dons an overcoat before sunset. No one thinks of casting off his flannel, or wearing a lighter coat on account of the approach of summer. With the ladies, however, the case is different. The occasional warm mornings of summer allow the exhibition of summer fashions, without prohibiting cloaks and furs. At night it is otherwise, the temperature requiring the use of blankets. Even in the interior, with the thermometer at 100° at noonday, blankets are almost everywhere required before morning. There is no climate in the world in which one sleeps so comfortably all the year round; and it is questionable if there is any other country in the temperate latitudes where people devote so much time to sleep.

The atmosphere is mostly dry, even during the summer mists; vapor never condensing on the walls, nor indicating its presence within doors in any other perceptible manner.

In its relations to the physical development of animals, including man, the climate of California appears to be propitious. Laborers will toil in the extreme heat, in the interior, and preserve their health and vigor in a remarkable degree. This is partly due to the dryness of the air, which promotes the rapid evaporation of sweat, and partly to the coolness of the nights, which favors rest and recuperation. The climate is remarkably adverse to epidemic diseases. The malignant cholera made a visitation in 1850, but was scarcely felt elsewhere than at Sacramento, where a combination of the most unfavorable circumstances gave it destructive power. Passengers have frequently arrived since that time, after traversing regions where the disease was raging, without introducing it. With the exception just noted, it might be said that no epidemic has prevailed in California since its settlement by Americans. Every summer an influenza prevails with greater or less force, in the bay climate, and in several instances it has extended along the coast into the neighboring region. Many of the interior valleys are subject to malarious fevers, but not generally of a severe type. The various forms of disease which prevail elsewhere are found here, but they present no peculiarities worthy of comment. Insanity, and diseases of the heart and blood vessels, are frequent, but this is due rather to moral and physical causes than to climatic influence.

The relation of the climate to pulmonary affections presents its most important aspect. Many persons threatened with lung disease, or but slightly affected by it, have regained their health completely by immigration. But the benefit is to be ascribed to the sea voyage, and to circumstances incident to change of residence, more than to the curative effect of the climate of the Pacific coast. To individuals in other countries suffering with tubercular disease in its established stages, this country offers no valid prospect of benefit. Consumption is developed in California as it is in most other portions of the temperate zone. The chilly winds of the ocean climate in summer, whilst they will, in many cases, brace the system against debility, and enable it to resist the invasion of disease, depress the vital forces in other cases beneath the power of resistance. On the other hand, the extreme heat of the interior leads to the same injurious results by its exhausting operation. But there is a wide range of climate between the two extremes, more favorable than any other on the Pacific slope to pulmonary patients, and much more favorable, it may be added, than the climate of the Atlantic States, either in summer or winter. The same may be said of the southern section of the State in general. The winter of California everywhere exhibits great uniformity in its relation to pulmonary invalids, and is decidedly superior to the corresponding season on the Atlantic slope.

# CHAPTER V.

## AGRICULTURE.

AGRICULTURE. Preliminary Observations. The Cereals: Wheat, Barley, Oats, Rice, etc. Grasses: Alfalfa, Clover, etc. Cotton—Flax—The Sugar Beet—Melon Sugar—Hops—Tobacco—Mustard Seed—The Amole, or Soap Plant—The Tea Plant. Fruits and Nuts: Apples — Pears—Peaches — Plums—Cherries—Oranges—Lemons—Limes—Bananas—Olives—Almonds—Chestnuts, etc. Berries: Strawberries—Raspberries—Blackberries. Dried Fruits: Raisins—Currants—Prunes—Figs, etc. Pickles, Preserved Fruits and Vegetables: Orange Marmalade—Quince Jelly—Onions, etc. Potatoes—Large Growths. Dairy Products: Butter—Cheese. Cattle and Horses—Sheep and Wool—Hogs—Bees and Honey—Insects. Wood Planting: Transplanting Trees—The Sirocco. Agricultural Implements: Steam Ploughs—The California Land Dresser. Irrigation—Under Draining—Famine Years—Late Rains—The Farmer's Troubles in California—Hints to Emigrants—Contrasts—Advantages—The Chinese in California—Farm Labor—Harmony among Producers. VINICULTURE. Grapes—Wine—Brandy—Wine Merchants, etc. SILK CULTURE. Mulberry Trees—Cocoons—Diseases of Silk Worms, etc.

Elsewhere in this work will be found general statements pertaining to the agricultural productions of each county in the State. One of the purposes of this chapter, is to present to inquirers abroad a clear comprehension of what a farmer in the Atlantic States, or in Europe, would desire to know should he contemplate emigrating to California. In endeavoring to do this, we have aimed to answer every question this class of inquirers would be likely to ask, not omitting to mention the disadvantages that exist, so that having the whole subject fairly presented to him he can act intelligently in the premises.

Except in treating of the dairy business, which requires peculiar conditions of climate and situation, we have not directed much attention to localities—for the area is very large from which to choose; and, besides, that is done elsewhere in this volume, where also will be found descriptions of the various soils, and quotations of prices. There is, however, no standard quotation anywhere except around towns, and there it may so change in a year as to mislead. In general terms, land is very rich and very cheap. Improved farms can always be bought of persons ready for a change at moderate prices. It may, also, be said that the trials and discomforts of the first year of emigrant life are less by sixty per cent. than in the western Atlantic States, owing to peculiarities hereafter explained.

The climate of California is so mild in winter, which is in fact the season of verdure, that very little feed or shelter is provided. Barns are almost unknown. Some degree of shelter would, however, prove beneficial to animals in long protracted rains. By February spring comes; ploughing begins in November, if, as is usual, the rain fall suffices to soften the ground; sowing following immediately after, except on lands subject to be flooded—but grain can be sown at any time during the winter months. The best crops are grown when the rains of March and April are sufficient to carry the growth to maturity in June or July, which is the harvest time. When these are deficient, early seeding fares the best. This system gives more pleasant and profitable winter occupation than in the Atlantic States. It is, however, in the time of harvest that the farmer finds his chief advantage; his crops are gathered without a rain fall to injure them, or to cause a day to be lost.

### THE CEREALS.

*Wheat*—The varieties of wheat chiefly raised are Chilean and Australian. Grain-cutters are in universal use. Threshing is all done by machinery on the field, and grain is sacked on the spot, where it may lie safe from injury, needing no shelter, till October. It is allowed to get fully ripe, and is so entirely cured that it never sweats in the ship's hold, however long the voyage; nor does this entire ripeness cause much loss of grain by falling to the ground in handling. It is a peculiarity of all seeds here, that the containing capsules hold them fast till the first rain relaxes their fibres and allows them to drop. On this account harvesting need not be hurried. A field of wheat may stand a month, or even two, after being fully ripe, and lose but little by its late cutting. This gives the farmer a longer time to dispose of his crop without immediately incurring the expenses attending carriage and storage.

A farmer who owns his land can always arrange for money advances, either to cover his first outlays for a crop, or to hold his grain for a market, if he be not too remote from shipping points. The great crop is wheat; nearly half the land under culture in the State being devoted to it. It is the money-making crop; therefore, we give leading particulars in regard to it.

Regarding the certainty of a market for wheat at fair paying rates, we give the aspect of the future, as it appears at this time. California produced in 1867 about fifteen millions bushels of this cereal, of which nearly eight millions were exported. The average market price during that year was $2 per one hundred pounds, the ruling rates in the early part of 1868 having been $2.60 per one hundred pounds. Our exports of flour during the year 1867 amounted to 520,000 barrels.

In no country can wheat be raised to greater profit even at the high price of farm labor, say forty dollars a month and board. Eighty cents a bushel, in favorable seasons and localities, pays the farmer, since one seeding can be made to produce two crops ; the second being termed a volunteer crop, and coming from the seed that falls in harvesting the first. The yield is somewhat less, but the profit is of course much larger, as there is no expense for ploughing and seeding. The California farmer is at no expense for manure ; he burns the straw! This looks like wasteful and destructive exhaustion of the soil. In some places it is being seriously felt, and in time it must work universal impoverishment of the land. But there is a large extent of land which has been in grain for fifteen years, and yet produces twenty to twenty-five bushels to the acre, as at first. There are well authenticated cases of fields situated in the San Joaquin valley, that have been cultivated to grain for sixteen consecutive years without diminution of the production, except one year, when the crops were a total failure, from the absence of the usual rains. Regarding the quality of California wheat, it may be mentioned that it commands extra prices in England and France, especially on account of its faculty of appropriating much more water in the baking process than other flour, and thus giving greater weight of bread. Our principal market for wheat is England ; next, New York, and other domestic ports. Freights to New York and Europe, during the year 1867, ruled at about $15 per ton. Flour is sent to New York, by steamer via Panama, for $2 per barrel, considerable being shipped by that route. Shipments to Mexico and Central America are increasing, as well as to various other parts of the world.

*Oats*—This grain, of which comparatively little was at first cultivated in the State, barley being preferred because of its greater cheapness for horse feed, has for the past few years been growing in favor, and is every year being more extensively planted. The total product of the State for 1867 reached about 2,000,000 bushels, the average yield having been about thirty bushels to the acre. The quantity received in San Francisco for the year from the interior was 282,000 sacks of one hundred pounds each. Very little was exported, nearly the whole being required for home consumption. Much of this grain is cut while green and made into hay.

*Wild Oats*—When California became first known to Americans the face of the country was nearly everywhere covered with wild oats. Though parched in the long summer, the grain held firmly in its capsule and supplied the most fattening pasture. It still prevails outside of cultivation, furnishing a large proportion of the hay in use in many localities. It differs from tame oats in being smaller, and in this peculiarity, that it has bearded projections, with bended joints, like the legs of the grasshopper. When the first rain comes it limbers out the joints, which being dried by the sun, after the rain, shrink, causing the berry to hop about, giving it a wide distribution over the land. The wild oat, though differing materially, is probably a climatic deterioration of the tame oats brought here by the Spanish missionaries some seventy years ago.

*Barley*—This grain being an almost certain crop, has heretofore been largely grown in California, the crop for 1867 being estimated at ten million bushels. It is here made to subserve nearly the same uses as oats and Indian corn in the Atlantic States, being the principal grain fed to cattle, horses and swine. Like wheat and oats, much is grown from volunteer crops, the yield being not only surer, but generally larger than that of those grains—averaging about thirty-two bushels to the acre. But comparatively little has heretofore been exported, though it is believed, from the superiority and cheapness of the barley grown here, in connection with the advantages that exist for manufacturing malt liquors, that this branch of business will, in a short time, be greatly expanded. Experiments recently made demonstrate that ale and porter can be made in San Francisco of a quality every way equal to the English article, while the coolness of the climate admits of brewing being carried on throughout the entire year.

*Rice*—There is a large consumption of rice here, by the fifty thousand Chinamen scattered throughout the State, the average annual consumption having exceeded twenty-three million pounds for several years past. Our large area of swamp and overflowed lands is well suited to rice, and the climate is equally so, but these lands cannot be used till guards are erected to regulate the water flow. No rice has yet been cultivated in California. There are many varieties of rice, and it is not always a water-plant. Many kinds are called hill rice, which produce a fine grain. With irrigation, it might be more profitable than wheat. But with irrigating canals all varieties could be cultivated, and this should be an inducement of some weight to urge their construction.

*Rye, Buckwheat and Indian Corn* are little cultivated. The latter can be grown to profit only in favored localities, on account of cool nights, late maturing, and an almost entire absence of summer rains.

### GRASSES.

There is little or no sod in California. In the Atlantic States and in Europe grass is killed by winter frosts, but the roots survive and make sod, which spring rains revive ; but the long summer drought of this climate, with scarcely any rain from April to November, takes the life from the roots, and for hay or pasture it is necessary to renew sowing every year. The hay of California is mostly made from oats and barley, cut before ripening, and as it is cured without rain, it has a bright, light-green color—when not too excessively sun dried. It is very nutritious—oat hay being preferred to barley. In isolated localities there are moist valley spots amid the rolling hills where there is some summer verdure.

*Bunch-grass* is a peculiar herbage on many dry hill sides, and affords a perpetual pasture. It occurs always in detached bunches, sufficient in size to make a small mouthful, and seems to be proof against drought—but is not cultivated. Wherever the sage-brush is found, (popular emblem of complete barrenness,) cattle keep fat on this curious grass—which flourishes under the shelter of the brush. It is the first verdure that makes its appearance and gives pasture in the early spring.

*Alfalfa* is a species of clover which gives perennial pasture and makes excellent hay, when cultivated. Its roots go down to moisture at depths incredible, and they seem to travel till they reach it; but once fairly rooted, it is difficult to eradicate this grass; and as it attracts gophers, to the great annoyance of the farmer, it is not generally in great favor —but its cultivation is extending.

*Burr clover* differs from other varieties in having a peculiar seed, full of rich oil, enclosed in a prickly capsule. Cattle do not fancy it much until it is dead ripe and scattered over the ground, but during the entire summer, and when to our eyes invisible, it supplies a nourishing food to the lapping tongue of cattle.

*Alfilerilla* has the appearance of the wild geranium but has not been cultivated. Wherever it grows it is the favorite pasture with cattle. It stands second to none of the grasses in its endurance of drought, and flourishes on hill sides, where alfalfa grass fails for want of moisture. To the eye, alfilerilla is a flattened tuft, hugging the ground. It appears to give scarcely a fair hold to the bite of cattle, but, if lifted up, it shows a great mouthful. In cultivated ground, wherever it has an opportunity to gain an undisturbed growth, it gives proof that it would yield a heavy crop, of good height and of unsurpassed richness, for hay as well as pasture. Probably it would prove more valuable to cut and feed in the green state. It is deserving of more attention than it receives.

*The Lupin*, which is cultivated as a grass in France, grows wild among the sand hills of the Coast Range of California, and could be made profitable where little else will grow, by planting select varieties. There is a coarse joint-grass which runs like a vine over the sands bordering the sea, and which spreads with wonderful swiftness—every joint sending down roots. For sheep and goats it would furnish a never-dying supply of pasturage.

*Timothy, Orchard, Herd and Red-Top*, as well as other favorite grasses of the Atlantic States, are limited to a few places in this country, because they would furnish but one crop, and then die in the drought of summer. But, in time, these grasses will be cultivated in moist mountain dells and on improved swamp lands; in certain localities they are now doing well.

Natural meadows of great extent are found interspersed among the watery tule lands. They are very wet in winter, and their grass, though a sure crop and heavy, is wiry, coarse, and of inferior nourishment; yet, at times, it is of priceless value. The year 1864 was one of famine to cattle in this State; the rains were scant, and the usual feeding grounds were barren. Some enterprising men cut fifty thousand tons of this coarse grass in that year, and it proved the salvation of a large number of cattle, and a source of great profit to the adventurers. Among the recuperative resources of the State, this may be counted on hereafter as of great value.

### COTTON.

Cotton encounters the same difficulty as corn, without irrigation; wherefore, it seems hardly deserving a place in the list of our agricultural staples. The time will come when irrigation, as a grand system, will be called for and adopted, rendering the more extensive culture of these articles probable.

### FLAX.

The establishment of a mill in San Francisco, and also one in Sutter county, for the manufacture of linseed and other vegetable oils, has had the effect to encourage within the past year a more extensive culture of flax and the castor oil bean than before. Thus far the San Francisco mill, the other having been more recently built, has been obliged to rely chiefly upon foreign importations for its supplies of linseed; but a desire having been expressed to take seed of home growth to the amount of five hundred tons annually, our farmers are likely to engage in the culture of the plant more largely hereafter. Flax being native to California, growing wild in some portions of the State, can undoubtedly be successfully and profitably raised on a large scale. Indeed, the trials already made show that there is no trouble in making good crops—over fifteen hundred pounds of seed having been produced to the acre, the stalk of the plant being large and vigorous, and coated with a strong and abundant fibre. The total product of the State for 1867 was one hundred and fifty tons; though it is believed a home market could be had for four times that amount at remunerative prices, the ruling rates heretofore having been four and a half cents per pound. Hitherto no fabric has been made here from this textile; but with such an extensive yearly demand for sacking, it seems highly probable that this plant will soon be made to contribute largely towards supplying this important and growing want of the State, this material having heretofore been wholly imported.

### SUGAR BEET.

Although the sugar cane cannot be grown in California, more sugar may be made from the beet than in any other country. This vegetable grows to an enormous size here and is of easy cultivation. Experiments prove that it is much richer in sugar than the beet of France, ten per cent. against six per cent. It is well known that when the sugar beet is taken from the ground and stored for winter use, it undergoes a chemical change, to the loss of a notable per centage of its sugar. In California, beets remain in the soil unharmed by frost, and keep on growing through the winter, so that they need not be taken up till wanted for milling. This would prove a great saving of the saccharine matter, avoiding also the cost of storage and handling. A company has been formed in France and Germany, through Mr. George Gordon, of San Francisco, for the manufacture of beet sugar in this State. This company proposes to buy the beets and not to raise them. They offer to erect works in any locality, and to any number and extent required, wherever fifteen hundred acres may be devoted to beet culture. It is likely that many will avail themselves of this offer, and by engaging largely in the growing of this root, supply, at least in part, the consumption of sugar in California by an article of home production.

### MELON SUGAR.

There is at the eastern base of the Alps much land subject to being destroyed by deep washings of sand, on which nothing will grow except melons, only two being allowed to mature on a single vine. As the melons are gathered, they are slashed open with a big knife, and a wooden scoop empties the pulp into a vessel where the juice is expressed. This is boiled rudely, and crystalized like maple sugar in the Atlantic States. The sugar sells at remunerative prices, is light colored and sweet. Red pulp melons give a darker sugar, white pulp is therefore preferred. We have in this State a great area of land similarly destroyed every year. This sugar-melon example is commended to poor men, who can get the free use of the space, and proceed on small capital.

### HOPS.

This climate is peculiarly suited to hops. The vine grows and bears well wherever it has been planted. It does best on low poles or stakes and running on cords between, by which its roots get shelter from our long summer sun. The yield, while the vines are yet so young, is over eleven hundred pounds per acre ; fifteen hundred pounds may be the yield per acre in 1868. The consumption is not yet sufficient for extended cultivation, but for reasons stated in speaking of barley, this will likely soon become one of our agricultural staples. In three years the hop vine gains maturity and weight of product equal to five or six years elsewhere. It yields an extraordinary proportion of the resinous lupuline that gives it value to the brewer, and its flavor cannot be excelled. The hop vine, once rooted, is profitable in other countries for seven years before it begins to fail, so that it needs small labor beyond annual trailing, cutting down, and gathering. In no other country are hops so easily harvested and cured as in California. In England they are almost always injured by mildew in the growth, and by rain fall in picking time. There the fruit never fully ripens for want of sunshine. It is greatly injured and discolored by the severe kiln-drying necessary to its preservation in packages. Here, untarnished by rain, or fog, or heavy dews, hops come to as full ripeness as it is convenient to permit with reference to the tenacity of the pollen or lupuline; so that the further curing requires very little artificial heat, and a very short exposure to it. They come from what can scarcely be called a kiln, holding that fresh green color that proves so desirable and makes them the admiration of the brewer. The crop of this State for 1867 amounted to about 425,000 pounds. At the French Exposition of 1867, a single bale of hops represented California in this article. It attracted the notice of the brewers and hop growers of England and Germany to such a degree that each in taking a sample soon reduced the bale to a mere remnant. Hops lose one half of their value if carried over the year of their growth, from the volatility of their aroma. They suffer therefore from long sea voyages, even if encased in air-tight packages. This is a tariff of protection to our growers. The home article commands about fifty cents per pound at our breweries.

### TOBACCO.

Encouraged by war prices, in 1861 and 1862, the culture of tobacco was tried in Napa and Russian river valleys, and at other places. Rich low land was selected which made the leaf rank—a quality corrected in some instances where planted on higher land. It was planted early, and cropped in September—no irrigation being found necessary. No one was skilled in curing it, but a fair Virginia-plug, chewing tobacco, was made of the leaf. The prejudice encountered by a new California brand rendered much of it unsalable. When a Virginia brand was substituted, however, the same tobacco gained favor to such an extent as to warrant the belief that it might be made a success. It did not answer for cigars, but some raised on higher land, from Connecticut seed, was found to serve well for wrappers. The price of tobacco subsequently fell, under over importations, and farmers could not continue its culture at current cost of labor. A good article can, no doubt, be grown, if the seed and the soil are properly selected, and skill and care are observed in curing the leaf. It would pay if it were to command ten to twelve cents a pound, and the consumption is large enough to make it an important production.

### CHICCORY.

Chiccory grows so luxuriantly, and with so little cost, that a second factory for the conversion of the root into coffee is now established in San Francisco, intended for a large export, as well as for supplying the entire home consumption. This mixing ingredient can scarcely be called an adulteration—for the taste of Europe and America demands it as an improvement. It modifies the bitter taste of coffee, and serves as a correcting aperient against the stringency that belongs to coffee. Fifty tons of chiccory were produced last year on fifteen acres in Yolo county.

### MUSTARD SEED.

The great pest of our wheat fields in the rich valleys, from Alameda to the Santa Cruz and Pajaro basins, is wild mustard. It stubbornly resists extinction, and so grows and overtops the grain with its yellow flowers that a stranger might mistake it for the crop intended to be raised. A small quantity has always been gathered here for table use, it being of excellent quality; but latterly it is found to make an oil adapted to all the uses to which olive oil is applied. It is gathered by Chinamen, who thresh and bring the seed to the oil mill in San Francisco, where they dispose of it at two to three cents per pound. Many who have made trial of it prefer this oil to that made from lard or the olive for cooking purposes; it also holding out against rancidity longer than the latter.

### THE AMOLE, OR SOAP PLANT.

The amole or soap plant, a white, bulbous root, having the size and shape of an oblong onion, grows sparsely on the prairies and foot-hills of California. When bruised and rubbed in water it makes a rich lather, and being possessed of highly detergent properties, was much employed by the early inhabitants of California as a substitute for soap, being in fact almost exclusively used by them in washing clothes. The stalk of the amole, which grows to a height of four or five feet, has numerous slender branches, thickly budded, the whole bearing a strong resemblance to the asparagus plant. The bulb has a fibrous envelope, ending in a hair-like tuft above ground, the outer coating, as it decays, becoming dark-colored and husky. These roots, being gathered by Chinamen, are taken to the factories, where the pulpy matter having been separated from the fibres, the latter are dried and twisted by machinery, receiving a crimp which they afterwards retain. When prepared, this material is the best substitute for curled hair matrasses and upholstering purposes. Within the past few years quite an extensive business has grown up here in collecting and manufacturing this fiber; and, as the raw material is abundant, and costs nothing but the gathering—the farmers being glad to be rid of this plant, sometimes troublesome in plowing—there is a certainty of its meeting with a steady expansion hereafter.

### THE TEA PLANT.

A few years since some plants were imported from China, but the cultivation of tea for beverage has never been undertaken in this country. Its true home would be among the higher foot-hills—as it becomes rank when grown in low lands. A wet soil is not desirable, a finer quality of leaf often being produced from thin soils, and where sixty days of snow give it winter rest. This is one of the hardiest of plants, and fire only kills the top, to give a new and richer growth from the roots. In

Japan and China the shrub grows three feet high, and bears two crops of leaves during the year.

### FRUITS AND NUTS.

It is not necessary to enumerate all the fruit trees—every variety has been grown in California. The Pomological Society gives a list of 1,186 as having been examined, of which 561 varieties are approved as doing well here, viz : apples, 178 ; pears, 122 ; peaches, 55 ; cherries, 43 ; plums, 33 ; apricots, 11 ; grapes, 18 native and 22 foreign ; strawberries, 25 ; currants, 18 ; gooseberries, 13 ; raspberries, 12. There are 625 varieties to which the Society does not give approbation, and we confine our list to the leading varieties of fruit sold in the markets of San Francisco.

*Apples*—Early: Red June, red Astracan and early harvest. Autumn : Fall pippin, Cooper's market, Porter, Rhode Island greening, and Jonathan. Winter : Esopus, white and blue pearmain, bellflower, black Detroit, Baldwin, Spitzenberg, red-cheek pippin, Schwaar, green and yellow Newtown pippin, Virginia greening, black heart, winesap, and Roxbury russet.

*Pears*—Early : Doyenne d'eté, Madelaine, Dearborn seedling, Bloodgood, and Bartlett. Autumn : Buerre Diel, Fondante d'automne or Belle lucratif, Seckel, Beurre clairgeau. Winter : Glout morceau, Easter Beurre, and Winter Neliis. Our best winter pears, such as Easter Beurre, find sale in Japan at good prices, and further regular consignments are ordered.

*Peaches*—Early Tiletson, Early York, Strawberry, Early Crawford, Morris' white, and late Crawford. The peach tree is a fine bearer here, but the curled leaf is spreading, and it may be found necessary to apply some remedy to check the disease, if the crop is to continue to be profitable. Our fruit trees were brought originally from the nurseries of the Atlantic States, with the seed of diseases peculiar to those localities. The same system of exhaustion has been pursued in efforts to continue certain limited varieties by grafting on stocks not of their kind. Nature demands continual change for healthy production, and in this climate of exhaustive growth it will be found necessary to resort to raising native varieties from the seed, in order to get plants that will allow fair play to Nature, in adapting them to the peculiarities of our soils and climate. It is a general rule that imported trees yield fruits here with flavor less pronounced than in their native homes. Following Eastern experience and forgetting the great difference of climate, our horticulturists have bared the stems of fruit trees to an unaccustomed sun, by trimming away the lower branches. As a consequence, the bark becomes cracked on the sunny side and insects enter. It is above all things desirable that orchardists and nurserymen turn their attention to this error, in growing and transplanting for new orchards; for existing orchards seem destined to suffer materially from this evil.

*Plums*—Drap d'Eté, green and purple Gage, Columbia, Bradshaw, red and yellow Magnum Bonum, Washington, Jefferson, and Pruno d'Agen. As the Washington plum, dried whole, proves acceptable to the Japanese taste, a market may hereafter be found for this fruit among that people.

*Cherries*—Early: Kentish, and Knight's early red. Late: Banman's May, Black Eagle, black Tartarian, Holland, and Napoleon Bigereau.

*Quinces*—Apple, or orange quince, preferred. Without exception, all fruit in California is larger than elsewhere, and all fruit trees attain in two years the size and maturity of five years in other countries. The borer has appeared in some hot valleys, but it is generally unknown. No other disease is known except the curl leaf in peach trees. This is generally prevalent in all our valleys, and some nurseries have worms that knot the roots of the young trees.

An impression prevails that all apples in California tend to mealiness, that they are deficient in flavor, and do not keep well. And it is said that the absence of native apple trees indicates that this fruit is not suited to the climate. These are errors. In our valleys, it is true, apples are not so good. But throughout all the foot-hills they are, in flavor, in keeping, and in every other respect fully up to the choicest standard abroad. Wild apple trees are native here. Pears and plums are our best fruits for flavor and weight of crop. Cherries do well, but birds trouble them. Apricots bear well, but they incline to be mealy, and insects prey upon them. The nectarine grows well, and is deliciously flavored.

*Oranges and Lemons* are proving a very profitable crop in Los Angeles county and further south, and their culture is being greatly extended. The trees require age to become profitable bearers, and in seven years attain only ten feet in height and five inches in thickness. They then only begin to bear, and not before the ninth year are they a source of profit. When in full bearing, one tree produces from one thousand to two thousand oranges yearly. The orange requires nearly ten months to ripen from the blossom, and the tree has insect parasites that are very destructive. Oranges come to us from Tahiti, Mexico, Cape St. Lucas, the Sandwich Islands, and latterly from China. But they are plucked green, of course, and have a poor flavor. Our own oranges, requiring but three days to be sent to market, may be plucked fully ripe; and if the quality of the fruit is good, they will take preference and make money very fast for the grower.

*Bananas*—Plants from the Sandwich Islands having proved that they will do well in our southern counties, some imported from Panama are being planted, and this greatest of all bearers may be counted upon as likely to soon take a place among our more rare and luscious fruit.

*Limes, Citrons, Pomegranates, and Quinces* grow well here, and no finer fruit than the latter is anywhere to be found—being entirely free from imperfection.

*Olives.*—The number of olive trees planted at the old Spanish missions, and their vigorous growth and bearing for over sixty years, prove their adaptation to our climate. Like the orange, the olive tree takes a long time to get into a profitable bearing condition, and not before the ninth year does it produce well. On this account its propagation has not been popular till quite lately. Now, numerous farmers are planting the tree in many portions of the State. It lives for hundreds of years in full bearing. It is a species of willow, and easy to propagate from cuttings. In the experience of over sixty years, there has never been a failure of the olive crop here; whereas, in Europe it often fails, and the fruit suffers injury from elemental causes. From the uniform excellence of our olives, we may depend upon their preference abroad; and for the same reason it is probable that the oil will be alike superior. The oil of olives is almost universally used in cookery in many parts of Europe, and it would certainly be adopted here also, if it could be had fresh from the manufactory. It is more wholesome than lard, cheaper than butter, and would probably bear export to India, where lard is not used, on account of peculiar views.

*Almonds* are produced in considerable quantities and of excellent quality, and large numbers of trees are being planted. The varieties are, paper shell, soft shell, Languedoc, and Marseilles. The almond is, in fact, a species of peach tree, in which the pulp of the fruit is not eatable, only the kernel being valued. If the tree continues to escape the curled leaf that attacks the other peach trees, it will prove most valuable.

*Madeira nuts* (white walnuts) have been growing here many years, and they are now produced profitably in several counties.

*Hickory nuts* are unknown in California. This tree, like the hemlock tree in Europe, refuses to grow except in a stunted and unhealthy way.

*Chestnuts* are under trial in a few places, and the Butternut is also being cultivated.

We have sent to Japan a large assortment of every kind of fruit tree, vine, and berry. An agricultural society there promises us in exchange the best varieties in Japan. We may expect to find many that will prove acceptable additions to our horticulture, especially in their adaptation to our climate.

We have spoken of the great freedom from disease which our fruit trees enjoy. But it should be stated that they are liable to be injured and destroyed by gophers, who love roots, and when the tap root is cut by them the tree languishes and soon dies. The Osage orange would make a cheap and enduring fence, but for the peculiar fancy the gopher takes to it. The presence of this rodent is well indicated by the fresh mounds he makes, but by vigilance, traps, and poison, he can be overcome. In very wet winters he goes to the hills for safety, and neglected hill-side orchards are often almost entirely destroyed. The apple tree louse covers the bark in a large orchard in Santa Clara. It is very injurious, and may spread to other localities.

### BERRIES.

Berries are an unusually productive crop in California, on account of the long period of their bearing. There is not a month in the year in which strawberries are not to be had in San Francisco. They are plentiful during five months, beginning with April, and the British Queen and Longworth's Prolific are most in market. They are chiefly supplied from Alameda county, and the picking is done by Chinamen, at half the cost of American labor—one thousand pounds to the acre being the usual expectation. More than four hundred acres are devoted to strawberries in that county. The Jucunda is a new variety, larger and of finer flavor than the Longworth.

*Raspberries* last four months—beginning in June ; the Falstaff is preferred. They are also chiefly cultivated in Alameda county, and China labor is used. About one thousand five hundred pounds to the acre are usually grown.

*Blackberries* last as long as raspberries—the Lawton being preferred.

*Currants* are in market three months, beginning May 15th—the cherry variety being preferred.

Of native berries, growing wild and plentiful, we have currants, gooseberries and thimble berries, (a kind of raspberry,) that are made useful.

### DRIED FRUITS.

One half the fruits of California cannot be marketed, so enormous is the crop, and so expensive the picking and cost of carriage. The most extensive orchard in the State is that of Briggs & Co., at Marysville, comprising one hundred and sixty acres, in a deep, moist, rich, and friable soil. The proprietors, finding the prices of fruit no longer profitable, have gone extensively into drying almost every variety. They cured over fifty tons in 1867, which in appearance and other respects, cannot be excelled. Owing to the power of sunshine and its unbroken continuity in the season, kiln drying is dispensed with, and the color of the cured fruit is therefore lighter and more attractive. This industry will be greatly extended.

*Raisins*—Led on by Mr. B. N. Bugbey, of the foot-hills, near Folsom, the raisin seems to promise us a new production. This gentleman uses the Malaga Muscatella grape, and has succeeded in making several thousand boxes of good cured raisins. Mr. Blowers, of Yolo, has made good raisins, and Mr. Brown, of Santa Clara, also. A good article has also been made in other portions of the State.

*Currants*, from the black or Zante variety, have been made in San José, and the experiments of two seasons prove that an article can be produced equal to the imported.

*Figs* are cured here, but have not been thus far of good quality. Owing to the inferior character of the stock, they are small and dark colored, but finer varieties are now being grown extensively, from which cured figs of the best quality will probably soon be made.

### PICKLES, PRESERVED FRUITS, VEGETABLES, ETC.

For these articles this State has, until within a few years past, been entirely dependent on importations from the Eastern States and England, and has annually consumed about a million dollars worth. California is now, however, on a self supplying basis in this respect, and our local manufacturers are amply able to meet, not alone the demands of this State, but also those of Nevada, British Columbia, and Mexico, together with an increasing market in China and Japan. California offers a peculiarly favorable field for this business on account of producing so large a variety of fruits, and the soundness and maturity attained by all vegetables. The producer and consumer have both been benefited, in preserving from waste the surplus of one, and giving to the other a fine supply and variety of fruit, more fresh and wholesome than imported articles. In this line Messrs. Cutting & Co., of San Francisco, are the largest manufacturers in the State—their house giving employment, during the packing season, to one hundred and sixty hands, in preparing for market every variety of preserved fruits and vegetables, meats, sauces, catsup, etc. The total annual production of these articles amounts to $650,000.

*Orange Marmalade.*—This confection has a consumption so very extensive in Great Britain as to form a commerce worth contending for. It is made in Scotland, and is known in the market as Scotch marmalade. The oranges are plucked in Sicily and elsewhere on Mediterranean shores, so very green, to stand the long voyage, that the marmalade is really a poor representative of the orange flavor. California could produce a superior confection from oranges ripe and carrying all the flavor of this sunny climate.

*Quince Jelly* is little known in England, but would be of easy introduction and in large demand there. It is the leading table confection in France and all over Europe, and it finds a ready market. This is one of those peculiar flavors which would probably suit the taste of Japan and China. The quince grows well everywhere in California, and as it is fit only for confection, but superior for that purpose, it may interest producers to suggest export markets for it.

The dried fruits of this climate would find a preference in every market of the world, because the drying process can be finished without interruption of rain, in the open air, and therefore without discoloration. They are being now largely prepared, and their appearance is very fine. The canning of fruits is also assuming large proportions, and will soon became an important industry.

*Burned Onions.*—The French make a great improvement in the onion by torrefying it and flattening it so as to resemble in shape, and to pack like the fig. Burned onions are now in general use all over Europe, and no gravy or soup is complete without the peculiar flavor and coloring they impart. The peculiar pungency which the natural onion has, leaving a long sustained unpleasantness on the taste, is entirely removed, and certain new combinations are effected by the chemistry of the oven, which commend it in this shape to every taste, while the natural flavor is well preserved, in a subdued condition. They are put up in packages of the same form as fig boxes, and are a source of considerable traffic. It is for home use, for ship stores, and for the markets of the Pacific, that we recommend this mode of preparing the onion, which grows so luxuriantly here. The French mode of preparation can only be judged by its appearance. It is black and quite flat, and seems to have been placed in well-heated ovens, probably under pressure, and that the time required for this purpose is short.

### POTATOES.

Potatoes are easily grown in most parts of the State, and generally of large size and good flavor. As yet they know no disease. They are often left in the ground all winter, being dug only as required for use or market. The crop of 1867 is estimated at two million bushels, the prevailing price in San Francisco being about eighty cents per bushel.

### LARGE GROWTHS.

Big vegetables and extra great yieldings we do not consider of sufficient importance to chronicle. But we may say that as a general rule all growths are larger in California than elsewhere; from big trees, thirty feet in diameter, to pumpkins and squashes of over two hundred pounds in weight. Beets frequently weigh over one hundred pounds, and potatoes and cabbages are also enormous. Our grains are all of greater weight than elsewhere as an average. Size is not, however, a good indication of quality, although at agricultural fairs it is generally so treated; but it is more important to know that vegetables in California are remarkably tender and succulent, and that great numbers of them grow in the open air all the year—such as cabbages, celery, and cauliflowers, always with fine heads—and also beets, turnips, carrots, parsnips, and onions. Many others, like potatoes, grow for ten months. Fruits also grow larger than in the Eastern States; so do fruit trees. As a general rule the tree in and from the nursery grows twice as fast and bears in half the time. This applies to every species. The weight of crop is larger and quite free from defects. But, if we except pears and plums, the flavor is less pronounced; so with strawberries and raspberries. Experience is insufficient in this young country to determine whether or not this rapidity of growth and excessive production leads to early decay. If the forest trees of the mountains may be a guide, the probability is that our fruit trees will endure as long as elsewhere.

### DAIRY PRODUCTS.

From Mendocino county to San Diego, a considerable portion of the Coast Range is well adapted for the dairy business. It has not its equal in some respects, the land being cheap, and the expense of keeping stock trifling. The Coast Range is a mountain chain running parallel with the ocean, and being bathed by its frequent fogs in summer, supplies moisture when all elsewhere is dry. The lowland strip, towards the ocean, is narrow; but on the eastern, or land side, there are valleys of great extent and fertility. This range of mountains is full of springs and evergreen nooks, often of considerable area, on its seaward side. The natural grasses that cover this whole range are very nutritious, consisting of alfilerilla, burr clover, bunch grass, and wild oats.

There are twelve hundred dairies in California, having fifty to one hundred and fifty cows each. The cows are a cross of imported with Mexican stock. They pick their own feed the year round, and receive no shelter or other care whatever. The dairy season comprises nearly the whole year—grass butter being always plenty in San Francisco.

*Butter.*—The following wholesale prices were the ruling rates for butter in 1867 : January and February, 50c. per ℔; March, April and May, 30 @ 35c. per ℔ ; June, July and August, 40 @ 45c. per ℔ ; September, October, November and December, 50. @ 70c. per ℔.

The season for putting up butter to keep is April, May and June. It is placed in small oak casks, convenient for packing on mules to go into mining districts, etc. But, for city use, the butter is made into rolls, covered with a cotton cloth, and laid down in brine. California butter is so firm and so free from oleaginous ingredients, that it keeps in this way a year or more, and turns out, still, fresh grass butter ; the salt does not penetrate enough to change it. When equally well made, it keeps much better than the eastern article, and requires a higher temperature to melt it. It has a peculiarly sweet aroma, by which it is readily distinguished from butter imported from abroad.

The production of butter in California for 1867 amounted to six million pounds—and half that amount of cheese was made. The imports of butter from the Atlantic States in 1867 were only half those of 1866; and such are the advantages enjoyed in carrying on this business that we may soon become large exporters. We are even now exporting to Panama, and to the West Indies, to China and Japan. The butter is packed in tin cases with salt.

*Cheese.*—The same advantages that apply to butter making are equally applicable to cheese—both paying a profit far beyond other countries, as is evident when the small cost of producing and the price in market are considered ; and each has alternate advantage, as the market varies, so that it is found best to combine the two.

In the dry air of this summer climate, cheese cures in a very brief time. In two weeks from press it is marketable ; at one year it is very compact, ripe and rich. Cheese two years old is not known here; January, 1868, finds scarce a cheese in market—so active is the trade. The preferred size is fourteen by four and a half inches—this being the most convenient size for packing on mules. There is a large consumption at the mines, and in the cattle ranches beyond the dairy ranges. Wormy cheese is a rarity. So rapid and complete is the curing that mites have little chance to generate, and no moist spells intervene in the long summer to soften the material, and give them life and movement.

Rennet is imported from Germany, where they have a method of preparation unknown to us. Our rennet imparts a flavor which prohibits its use.

### CATTLE AND HORSES.

The wild cattle of the Mexicans are poor, long-horned and lank—but they cross well with imported stock, carrying the fine points of the latter and the endurance of the former. Great attention has been paid to crossing, and very soon the pure native stock will be extinct, for it is unprofitable. Their flesh is tough, and their milk scant. The present number of cattle in California is about six hundred thousand—the horses amounting to two hundred thousand.

Much greater scope of land is required here to graze the same number of cattle than in countries visited by summer rains—the grass, when once cropped, not readily springing up again the same season.

The native Mexican mustang has many excellent qualities, among which is great endurance. He is capital under the saddle, and very quick in his movements. No horse excells him in keeping up a steady liveliness. He will subsist on scanty food and bear you sixty miles a day, upon occasion ; his gait being always a gallop. He is of light weight, and not well suited for draft. American and half-breeds are fast supplanting the native stock. The imported horse improves by the change of climate, and racers become longer winded. Mares foal before they are three years old, in California, and cows bear young before they are two years old.

Mules are not numerous—being chiefly used for freighting goods into the mines and over the mountains. They are also employed for packing into districts where wagon roads are impracticable.

In no country are cattle raised at so trifling cost. They get no shelter and no feed except the wild pasture of the mountain ranges. As the Spanish grants, seldom less than four thousand acres, and often twenty thousand or more, are being subdivided, the wild ranges grow shorter ; and as farmers become numerous they will be able to obtain legislation compelling the herdsmen to keep their stock from trespassing. This restriction is working notable changes and increasing the cost of cattle raising ; but it is improving the stock, by inducing more attention, and in the end will be more profitable.

We have said that no provision is made to feed at any season, and no shelter is given. Though this system may in three years out of four entail no loss, there do come years when the destruction of life among cattle, from starvation, is terrible. When the winter rains fail, the summer pasture also fails; and when, in the midst of winter rain, there comes frost to retard the growth of the herbage, the feed is cut off, and want of shelter, joined to want of food, kills off the cattle by thousands. The winter of 1862–63 is an example of the latter, and the summer of 1864 of the former casualty. Again, it happens after the first rain in November has destroyed the dry herbage, there comes a dry and cold spell, during which the growth of the grass is kept back, causing much suffering to the cattle. In 1856, seventy thousand head of stock were lost in the county of Los Angeles alone, and in 1864 half the native stock is said to have perished.

### SHEEP AND WOOL.

California is, perhaps, the best country in the world, excepting Australia, for the raising of sheep. Nowhere do they so thrive and multiply with so little care; and no fleeces of similar breeds are so heavy. Here, in the mountain pastures, they roam and feed themselves the year round. Sheep love length of range, and they have it here. A dry soil and climate is their special preference, and in few countries is the dry season more protracted. Great pains have been taken to improve the native breeds by crossing with choice foreign selections. The cost of keeping sheep is so trifling, and the increase is so great, that it is a very money-making business. Most of the diseases common elsewhere are unknown here. Two men and a boy will take care of ten thousand sheep—the chief labor being to drive them into pens at night, to protect them from the coyotes and other wild animals—which, however, are not numerous. Sheep in this climate are at two years, of the same size as they are at three years of age on the Atlantic side. The ewes begin to bear when one year old; and twins occur much more frequently than is usual in other countries.

One third of the wool of California is a second crop, clipped in autumn. This second shearing, however, is disapproved of by many sheep raisers, as tending not only to shorten the clip of the following spring, but to rob the animal of its necessary protection during the winter. The average quality of wool is now nearly up to half merino, and every year it improves as the breed grows better; but the condition of its delivery, though improving, is still complained of. Unless shearing is done rather too early, the burrs of the burr-clover get in the wool, and depreciate its value.

The estimates for 1867 put the whole number of sheep in the State at over two millions, of which fifteen per cent. went to the shambles. For 1868, nearly three millions are counted on for shearing.

The wool product of 1867 was about nine million pounds. The very low price of wool at present gives temporary discouragement; but sheep husbandry in California will always pay better than in any other State in the Union.

### HOGS.

No stock in this country is more easily reared, or multiplies so rapidly as swine. In many places where the soil is thin, oak and other trees supply vast ranges of mast feed—the baked soil of summer, however, renders it difficult for these animals to root well. The tule cane, covering so very extensive an area of swamp land, has potato-like bulbs at the root, upon which millions of swine could fatten throughout the summer; the spring shoots also give a good pasture. This land being all free, and likely long to remain so, presents inducements for engaging in the raising of these animals.

### BEES AND HONEY.

No bees were found in California at an early day. But so great has been their increase in nine years, since they were first imported, that honey is now very abundant.

Unlike almost everything else, the bee can be profitably raised only under certain conditions. They must be near a river, or moist lowland. In the great plains many of them perish in the dried up fields after the first months of spring—requiring all the honey they make to keep them alive and in health. The farmer can readily raise honey for his family, by cultivating summer flowers. But we speak of honey culture as a business.

The banks of the Sacramento are lined with willows and wild flowers, which afford the bee rich pasturage in March, April and May. Then follows a period of six weeks in which there is not sustenance enough in the fields to support him, and he must draw upon the honey in the hive. From early in July to October, the bee finds good support from the honey dew found upon the leaves of the cottonwood, upon some oaks and the wild cane that grows ten feet high, and has leaves twelve inches long by one and a half in width. The honey dew is an exudation from the body of a species of aphis, which is most plentiful in seasons of greatest warmth. But the occasional siroccos (mentioned elsewhere) are death to the aphis.

Honey made from this dew is coarse and unfit for market, and it is reserved for bee feed. In autumn there comes, in many localities, a new variety of flower pasture; and the creosote, named from its odor, is an annual that supplies bee feed for six weeks in September and October, making very white honey; but it crystalizes. Spring honey is the best; and that from the mountains command much higher prices. The wild buckwheat affords good autumn bee pasture, and wild mustard supplies fine feed in spring. Cephalanthus, manzanita, arbutus or madroña, wild azalea (very long in flower), sweet alysum, alfilerilla, clovers and a sort of wild mint supply pasture for the bee. But best of all for rich honey, is the wild sage of the mountains, which flowers from mid April to the last of May.

Mr. S. Harbison, nurseryman and bee culturist, near Sacramento, is a pioneer in this pursuit, and has now one thousand hives. He usually sends part of his stock into the mountains to feed on flowers that blossom there later than in the lower valleys.

The honey of California is distinguished for its great body, but it differs materially according to the locality and the predominant flowers at the time of its production. The yield of honey to the bee in California is double that made usually in the Atlantic States. Bees consume here much more of their stock in summer than in winter for sustenance, and though they require so much less honey for support in this country, they work and store all the same. California has a great variety and expanse of very gay flowers, like the escolchia, that never die ; but, as a rule, the gayer the flower the less honey it has. This fact might furnish a text for moral instruction. Honey comes to market from Los Angeles, and is so abundant and cheap (twenty-five cents a pound) that the production does not seem remunerative at this time. At fifty cents per pound it would pay well. We have the moth and the yellow jacket, but they are not so bad as the "foul brood," which destroys the larva—coming here through some hives sent from the valley of the Mohawk.

## INSECTS.

Until very lately California claimed immunity from nearly every disease and every insect which afflicted the farms and orchards of other countries, but we are beginning to find that these evils are coming. The grape fly has taken possession of the vines in several localities. It is a species of microscopic grasshopper which has always fed on the alfilerilla grass, and now shows preference for the grape leaf. By day it lies concealed and sheltered from the sun on the under side of the leaf. At night it feeds on the upper part of the leaf. The leaf is the lung of the plant, and soon its destruction causes the fruit to wither. The vine itself will certainly yield to this life-sapping process; but the evil is not yet wide spread enough to arouse public attention to devise a remedy. Touching the stem with petroleum is suggested, in order that the ascending vapors may kill the fly. The apple borer and one species of curculio have been found in a few places. Grasshoppers, and crickets, and the army worm have at times been destructive, but not over any extended area. The wheat fly will not probably give trouble so long as foreign grain is not imported, though some new parasite may be looked for, following the vegetable laws elsewhere universally revealed. Vegetables are as yet but little affected by diseases or insect parasites; but the forced cultivation by market gardeners must lead to their production.

### WOOD PLANTING. .

Wood is scarce along the line of our chief farming lands, but it need not continue so. Trees can be planted which in five years will give, in thinning out, most valuable wood. In six years they would be larger than at ten years in the Atlantic States. Many of the farmers of California are now in a condition to make investments of this character. It is unnecessary to specify the trees best adapted for fuel and for farm use, for experience will teach what varieties are best in each locality. There are, however, many trees that would be a source of large revenue, and of grateful shade and pleasant prospect which, may be mentioned. The Peruvian bark tree, chincona, was imported into India, and is now growing in extensive groves on the foot-hills of the snowy Himalayas, producing the finest quinine and paying beyond all other pursuits. By investing the bark with moss for eighteen months, it thickens and grows richer in quinine. The Japan varnish tree may be seen, in healthy growth, in the city gardens of San Francisco, and it would pay to cultivate; the wax tree also among others. Besides paying, these groves would beautify the landscape, now so dreary and barren, and throw some attractions around to give an air of home comfort, where now seems only desolation. In France, great amelioration of the climate is being experienced from the extended system of artificial wood-planting inaugurated years ago by government, under compulsory legislation.

*Transplanting Trees.*—It is the custom here to follow the course pursued in countries of quite different climatic requirement, in founding an orchard. The tree is raised in a nursery, grafted there, and afterwards transplanted to its permanent home in the orchard. In other lands, where summer showers supply moisture to the plant through surface roots, this practice answers; but, in California, the instinct of the plant makes its first and greatest effort in the formation of a grand pump-root, which it sends rapidly downward in the nearest direction to moisture, for safety to life in our long summer droughts. The plant cannot be taken from this first position without mutilating the pump-root, and it will not afterwards continue its course in the same direction as before; but, instead, it throws out, probably, several shoots in less favorable inclinations. It may be supposed that, on this account, the tree will be less able to sustain itself, especially in seasons of extraordinary trial. Agriculturists, from Europe, especially, are warned against adherence to their experiences abroad as infallible guides in a climate so entirely dissimilar. In nothing does this counsel apply so forcibly as in tree culture.

### THE SIROCCO.

During nearly every summer, some spells of extraordinary heat occur in the interior and southern section of the State, with a burning wind from the north—usually limited to three days. The thermometer runs up to over one hundred degrees of Fahrenheit, and the hottest current courses near the ground. In 1859, such a sirocco passed through the nursery of Wilson Flint, at Sacramento, and destroyed thousands of young fruit trees by burning off a ring of bark close to the ground. It is an early hint to the horticulturist—warning him not to remove the lower limbs and bare the stem to exposure in this climate; for, though the effect be not so visible on large trees, at the moment, it must injure them, and, by repetition, bring decay.

### AGRICULTURAL IMPLEMENTS.

Labor saving machinery is largely employed in California farming. Seeding, hay making, grain cutting and threshing machines are more used here than in any other country, in proportion to the crops. They cost the farmer double the prices of the Atlantic side, but the high price of farm labor necessitates their general use. We have as yet no steam ploughs, but in no country are they more wanted, nor is any soil better adapted to them, there being but few stones, while the enclosures are generally of large dimensions. The only drawback is the scarcity of fuel, but where the ploughman's wages are three dollars a day this expense can be afforded. The ploughing done is usually very shallow, an evil that the steam plough would correct, and bring back to original production all lands now showing a falling off; for, as a general rule, our soil is deep. The gang plough, which is superceding the single plough, consists of two to four ploughs set in one frame. Of all the ploughs sent from abroad scarcely any exactly suit, and for this reason the home made is increasing in favor. Now that wealth is accumulating among farmers, it may be expected that, as in England, they will associate together and soon have steam ploughs at every important center. This will give great expansion to cultivation by deeper and better dressing, and greatly increase the production of the present area.

*Steam Ploughs.*—In England they are not locomotive. The engine is fixed on a track at one end of the field and the gang plough is drawn back and forth by ropes and pulleys. It turns over twenty to thirty acres a day, and in perfect execution, surpasses the horse plough. If it could be locomotive it would do much more work. The climate of England is too moist for firm wheeling, and the land is also too undulent. In California it is different. If ploughing be done in summer the engine would always be sure of a hard bottom for wheeling. In our grain valleys the sweeps of land are long and level. Perhaps there might be difficulty in getting the plough through some of our toughest adobe soils in the season of their hardest baking, but then the ploughing time could be changed. In all other soils there would probably be no difficulty. There are in our valley lands no stones to give hindrance. For side-hill ploughing there would have to be special adaptation of machinery. Summer fallowing never can be extensively done with horses in our dry-baked soils, and unquestioned benefits must be lost unless steam comes to our aid, or irrigation be introduced to soften the ground. The steam plough and its follower would give us deeper tillage, finer pulverization, better seeding and covering, and it may be safely added, one third more harvest. This subject is ripe for notice. There are now being brought out some California inventions in the way of locomotive ploughs and dressers, and everything seems to promise their successful introduction here.

*The California Land-dresser: a Steam Locomotive.*—The traction steam plough in common use in England has been alluded to as well as the adaptability of our lands to its use. All efforts to make a steam locomotive plough failed there. Rotary diggers have not succeeded, and it appears to be reserved for California to bring forth an entire new machinery; not to plough, but, still better, to dress the land—to make it as if it were spaded and finely raked, and to be operated by a locomotive steam engine.

Ploughing simply cuts a slice of land and turns it over without much breaking its compactness. The harrow scarifies the new surface superficially and covers the seed imperfectly. Rolling makes smooth the top, but it also compacts the soil and lessens its permeability. The land-dresser does not slice and turn over, but it cuts up, tears to pieces, shakes the earth from all grass and weeds, and leaves the field one even sheet of finely pulverized earth, as if it had all been spaded and passed through a grinding mill. If seed be sown on the hard surface in advance, the land-dresser will cover it up completely and leave it in a soil so loose and so fine that the grain takes at once deep root and secures the greatest vigor of growth. In our climate this condition of the soil and of deep rooting, will enable the plant to thrive with less spring rain; and in this mode of covering, twenty per cent. more plants will be grown on an acre.

The land-dresser has had two public trials in adobe (stiff clay) soil never before opened, and the same was wet and covered with herbage; so that the principle was well tested. The California land-dresser may be described for popular comprehension as follows: The locomotive engine and frame were not made for the purpose, and this description is confined to what belongs exclusively to the machine itself; premising that there are in front two low and broad wheels, with a steering gear. Attached to the rear end of the car is a frame of wood into which are inserted four separated shafts, revolved by beveled cog-wheels, and each one in a direction opposite to its neighbor. In the bottom of each shaft are four horizontal arms; to the end of each is fixed perpendicularly four knives, each made like the coulter of an ordinary plough. There are two great wheels that operate the revolving shafts and bear up the rear of the car. They are each eight feet high and thirty-four inches face, giving in all five and two-thirds feet bearing on the land. The space between the wheels is required for the works of the machinery. The car goes forward one hundred feet a minute, and the coulter blades, penetrating the soil as the guage may limit it, revolve horizontally, making one hundred and forty revolutions a minute. The effect is exactly like so many augurs boring holes in a plank. In one minute a plank, twelve feet wide, say six inches thick, and one hundred feet long, may be conceived as turned into fine saw-dust, which occupies exactly the place where the plank was. There is this difference: the augur moves only on a fixed center, and cuts out circular slices. But the coulter knives are moving forward with great velocity, cutting an inch at a slice; every atom is cut up into powder, and every root is divested of its soil. It leaves behind it, if it is wet clay, a smooth bed of mud; it is evident that if dry, it would be a bed of fine, ash-like earth. Each set of coulter-knives cuts a circle of three feet, and the four sets dress a width of twelve feet. The movement is very like a steam propeller whirling through the water. It scatters the earth in spray, as though it were water. Each circle cuts into the circle adjoining, so as to leave no ridge standing ; and each circle revolves in a direction opposite to its neighbors, so that there is no tendency to cant towards one side. Ordinary field stones are tossed about, and do not interfere. To guard against a fracture of the knives by larger obstructions, there is mechanism which relieves the knives in such cases. This was not attached on the trials made, and one circle of knives was broken by a boulder.

The principle of the horizontal cutters has certainly proved correct, and the execution shows how greatly superior it is to ploughing. It only remains to be further proven by extended trials if the machine has any unlooked for defects which may lessen its value. The working is so simple that one cannot conceive of any difficulty, unless it may arise from the speed that is given—one hundred and forty revolutions a minute to the ground cutters. The solid earth is shaken, as it were, instantly into dust. Certainly, no machinery, or series of machines, before applied to the dressing of soil, ever produced work at all comparable to this. It is not yet known what weight of machinery will be found necessary—but five to six tons, probably. It is intended to move over undulating land, and on hill sides of certain gradients. It appears as if it would dress thirty to forty acres a day. Should its success prove complete, grain can be raised at less than half its present cost; and twenty per cent more yield is a moderate estimate. It will relieve the farmer of his hardest toil, and it will open a new era and brilliant future to agriculture as a profitable industry.

The inventors of the California Land Dresser are Messrs. Coffin & Standish, of Martinez. The probable cost may be $10,000 at the high rates current here. The land-dressing frame can be removed, and any other agricultural machinery attached ; so that harvesting and threshing can be done also. It will be easy for farmers to associate in the purchase of such a machine, and readily arrive at the comparative cost with horse ploughing. But the greatest gain will be found in the refined work it does, and the recuperation of our overtasked and unmanured soils, by going deeper, and giving renewed vigor to the growth. As will be shown, in speaking of irrigation, soil so pulverized as not to pack hard in the season, will keep moist in summer by reason of the capillary conduction it keeps open for the ascent of the subterranean waters. In many seasons, like the drought of 1864, this would save the crop from destruction.

Ploughing is usually done here after the first full rains of November; but often it is interrupted by over-wet seasons. The land-dresser could do its work all summer, so that operations need not be hastened, and the benefit claimed for summer fallowing may be realized, if, indeed, this system of dressing will not supercede its benefits. It may be suggested that the steam power of the machine might be greatly diminished, and its liability to fracture lessened also, if the arms which carry the knives were shortened so as to cut a circle of one half the diameter.

### IRRIGATION.

Except in a very small way, as in the arid plain of Los Angeles, and in Yolo county, there is no extended system of irrigation in this State. Cultivation is confined chiefly to places and to crops which do not need it. The various cereals mature so early in summer (June) that with a few showers in March, besides the usual rains from November to that month, the crop is secure. The weight of the crop is, however, determined in great measure by the later rains. Heretofore the practice has been in setting out trees and vines to employ summer irrigation for the first year or two, after which it is generally dispensed with. In cases where water has not been conveniently obtainable, this aid has been entirely dispensed with. There is, however, a vast expanse of steppe land lying east of the great valleys, and rising in plateaus towards the steeper hills of the mining districts, that are at present of small account, but which could be made valuable by irrigation. On these plains and rolling prairies the drought parches everything. Even drinking water lies at great depths, is scant, and of bad flavor. The soil is thin, yet every acre can be supplied with flowing water by a proper system.

California is well situated for a grand, economic, and thorough system of irrigation. The great snow-covered Nevadas, rising seven thousand feet above the plains, run nearly the length of the State, and command the whole western slope with the means of ample irrigation. Great lakes of supply lie on the high ranges, having fine depth, and snow remains there all summer, melting under a fervid sun. There is reason to believe also that there are much larger bodies of water preserved under ground than above. Sufficient water to inundate all the present cultivated fields and orchards is now drawn from these mountain sources for mining purposes, millions of dollars having been invested in large ditches, often hundreds of miles long. Their only use now is to desolate the land, to break down and wash away thousands of acres of rich soil annually to get the gold it contains.

Whatever present value it wins, it must be at last a loss to the State, for the land is forever destroyed. But, from these pioneer waterworks we have complete engineering for a system of future agricultural irrigation, that will at no distant day succeed them, and perhaps compensate for their terrible devastation, by doubling the production of a far more extended area of land below. Artesian water, judging by past experience, seems to be plentiful in all the valleys that lie embosomed amid broad and lofty mountains, which supply water to the channels that in California lie deep below the surface; and to reach them, by boring one hundred and fifty to three hundred feet, is not so expensive as in most other countries.

Allusion is made elsewhere to the absence of creeks and brooks. They are everywhere to be found in winter rain-time, but in summer only their stony beds are seen, or mere threads of water.

The sources of water supply in California are nevertheless fully equal to those of other countries, and if they have no vent on the surface they must have it below the surface. Evidently this is a provision of nature to meet the exigencies of our summer drought. The same streams and lakes that in other lands will better bear evaporation, are here culverted over and put out of the way of absorption by our six months of continuous sunshine. And thus a bountiful supply of water is reserved for all who take means to bring it forth as it is needed. Besides, the soil of California as a rule has a peculiarly open system of pores, and the rocky measures lie mostly at steeper grades than elsewhere, so that there is a free upward movement of water attracted by the dry atmosphere, wherever the surface soil is kept loose enough to give it vent. Evidence of this is given in two ways. On our hills, so dry to the eyes, grape vines, fruit trees, forest trees, bunch grass, and a dense mass of bushy shrubbery flourish during the entire six months of baking and burning summer sun, evidently by the water supplied to the roots from below.

Another curious proof is this : our dry season begins, say, May 1st, and lasts till about November. In all reasoning we should expect that the earth, and its springs, and all that grows upon it would continue to become more dry, and each month more exhaustive than the preceding, till the first rain arrives and brings relief. But it is not so ; the driest time is in August. About the middle of that month the springs begin to rise, and fountains of hill-side waters, previously dry, soon after commence to flow again. Whatever the cause, it is certain that the same thing occurs in the water supply to the roots of plants. This is their salvation, and but for this provision the grass and all slightly rooted herbage would wither and perish. The explanation of this interesting phenomenon is presumed to be as follows : solar evaporation grows less, because of the shortening hours of day in August, and as the relief of night time becomes greater, the ascending vapors from the subteranean waters are checked and held in suspension, gradually condensing till, at the surface, they meet the cool night air of this climate and become water. Now, this process regularly gives increased supplies of moisture to the plant, and the process must also at all times, before August, be one that increases by night the water supply to the trees.

When this law is understood by the owners of vineyards and orchards, located on the hill-sides of porous ground, and even on high summits, they will find that keeping the soil loose will give better and healthier watering to the roots than artificial irrigation from the surface. If these premises are right, Nature's arrangement of the roots should not be disturbed by transplanting.

The foregoing remarks are intended to apply to ordinary seasons, when winter rains suffice ; but there are extraordinary seasons in California, when the rain-fall is so scant that no crops are obtained ; and there have been seasons when the rains of March and the showers of April were so scant that our grass and grain crops were much depressed below the usual standard. Our agriculturists have experienced so few of these lessons that there has been no popular awakening to the danger to be apprehended. Some thoughtful men, after a season of failure, pressed upon the farmers of Yolo county a cheap and efficient plan to secure ample irrigation for one hundred thousand acres of rich wheat land by the waters of Cache creek. Wherever irrigation is provided it will insure thirty-five instead of twenty bushels of wheat per acre in an average of years. It will give summer crops of many other productions, such as flax, sugar-beets, rice, cotton and tobacco, and would save the State from the terrible visitation of famine seasons —which are certain to come; besides, if there were such means to render farming more sure and farm homes more attractive, there is no country to which people, not farmers, would so flock for its health, its comfort, and its easy means of livelihood. As far as practicable, emigrants should seek to secure farms which can command the means of irrigation when it becomes necessary or desirable; but it would be well also to select lands which, in years of ordinary rain-fall, will not require artificial watering.

### UNDER DRAINING.

In every season of full rainfall, as in 1866–7 and in 1867–8, the water forms lagoons over thousands of acres of the most fertile land in the State, rotting the growing grain. What is lost would often have made a drain of permanent prevention. In England under-drainage is universal, and it nearly doubles the profits of all agriculture. Tiles and drain-ploughs are used there to cheapen the process. A drain thus made is perpetual. A farmer of Santa Clara county has forty acres now drained. It is a stiff gravelly loam, with a subsoil of white marly clay. Though very rich, the drowning has hitherto made it unproductive. Now it is drained. Instead of a lagoon, slow to dry, and when dry coated with alkali, he has a field that is quickly ready for the plough after rain ; the soil is friable and the alkali drains off.

### FAMINE YEARS.

Fruitful as our country is, and more than other lands equable in its production, there have been, and there will be, occasional years of famine to cattle, and scanty food for man. Within nineteen years there have been three such seasons. In 1856 there was terrible loss of stock. In 1862–3 the pasture did not respond to the winter rains, by reason of the cool atmosphere—the stubble had been burned in many places and the straw, as usual, consumed by fire, to get rid of it. Had the latter been preserved it would have saved the stock from the terrible destruction that followed. In 1864 there was so scant a fall of rain that all crops failed, cattle famished, and dire distress and high prices prevailed in many places.

In some localities the grasshopper and the army caterpillar have occasionally eaten up every green thing; and such visitations may be expected in the future. It may hereafter be found expedient to make some provision for feeding stock in winters of extreme severity, as well as in seasons of famine. If there be fair winter rains, cattle fatten from early spring to midsummer, (March to mid-July); from that time till rain comes they have scant pickings, and always at the expense of their flesh. Their hardest time is in November and December; the dry summer pasturage being rotted down, and the new grass unfit for cropping. January is sometimes as bad, when a cold spell comes to retard the growth of the sprouted herbage ; but February is usually good for pasture.

### LATE RAINS.

It may be supposed that a good rain in summer would be hailed a blessing. Far from it. Nothing would be more disastrous. Everything seems to be arranged in the order of Nature, to suit the long period of our drought. By reason of the manner of growth all seeds hold firmly to the containing envelope, instead of shelling out as elsewhere. All grasses that dry standing cure like hay, and carry their usual nutriment which they retain on the field till the first rain. The rain loosens the capsule, casts out the seed and rots the grass-hay beyond resuscitation—since it would not suffice to make new pasture from the seed, with one or even several showers;—nor could it, even then, survive the arid sun and the newly baked surface soil. All cattle would inevitably perish; for the summer feed, prepared expressly for a long dry season, would be entirely destroyed, leaving not a tuft behind.

It may be thought that irrigating in summer would be a relief to the tree and the vine, even if not really necessary. But it is not so. When summer water is given to the plant, it closes the surface pores of the soil by a baked paste, and the connection is broken off between the subterranean waters and the dry atmosphere. The waters then cease to be drawn upwards, and the roots suffer or perish. The only remedy is to break up the baked surface and re-establish the connection. If irrigation is employed it is necessary to continue it, for the natural and the artificial in this case are antagonistic.

### THE FARMER'S TROUBLES IN CALIFORNIA.

The vast plains of rich soil that chiefly attract the farmer are treeless. The forests are far away in the mountains, and transportation is very expensive. Farmers in the western Atlantic States will understand this, for the same objection exists to their prairie lands. California cattle men have had, so far, the free range of all unfenced lands, and the cost of fencing out their stock is so great that fences are usually so light as to prove an imperfect protection. In selecting land this should be a matter of inquiry.

At the present session of the Legislature of California a great pressure is being made from the farming interest, asking the repeal of all laws requiring farmers to fence out trespassing cattle, and demanding that, instead, the owners of stock shall fence their cattle in or herd them, and that they be responsible for damages if they allow them to plunder their neighbor's crops. This would relieve the farmers of a burdensome annual tax, and would greatly extend the area of cultivation. Nothing better could be done to attract immigration. The farming interest, now, far outweighs the cattle raisers, and this fact, added to the great desire to draw immigration, may cause the repeal of the present fence laws.

Gophers abound almost everywhere. They live under ground, and feed upon the roots of trees and vegetables, and their multiplication is enormous. They do little or no injury to the grain fields, but in the gardens, in orchards, and shrubberies they are very destructive, cutting off the roots and killing the plants. It is necessary to be very vigilant to prevent their depredations. Ingenious devices are numerous for catching gophers, and poison is extensively employed. Ground squirrels, which also live under ground, but feed on the surface, are destructive pests in certain localities. They are not so generally distributed as gophers, but they rob the grain fields. The only sensible relief comes from poison and chiefly from the winter rains, which, when sufficient to damage the crops, also sometimes drown the squirrels in their subterranean lodges by millions. But for this occasional grand slaughter, their vast increase would make the country they infest almost uninhabitable. These squirrels usually live in communities, dwelling in burrows which they often share with the rattlesnake and a species of small owl, the whole living together harmoniously. The spots usually selected for these burrows are where the ground swells into little knolls, a sandy soil being preferred, these conditions affording some protection against overflow or excessive rains. Sometimes these squirrels are solitary, living apart instead of inhabiting these villages, which are not unlike those of the prairie dog.

### HINTS TO THE IMMIGRANT.

The immigrant will meet with some difficulty in seeking a location for a settlement in California of which he should be advised. We have only two navigable rivers and but few railroads completed as yet. Several new railroads are projected, however, and will probably soon be constructed through a number of fertile valleys. The cost of railway traveling is ten cents a mile, and steamboat fare is generally five cents per mile. On all the stage lines twenty cents per mile is the usual fare, except when an occasional opposition reduces it for a short time. Distances are great between settlements, and the cost of living is tolerably high. To get suitable land at low price requires considerable travel by stage. On this account the immigrant, to save his purse, should take counsel of some trusted friend, and confine his examination to a few localities.

Farmers in the Atlantic States naturally prefer the neighborhood of a river or at least of a running brook. We have but two streams worthy the name of rivers properly so called—the Sacramento and its confluent, the San Joaquin. The lands on their borders are almost entirely swamp, or subject to overflow. They breed fevers and mosquitoes, and have few tributaries that are not dry or nearly so in summer, and also are subject to wide overflow in winter. As a general rule, the immigrant will find it safer to seek other localities than those near the water courses. Almost everywhere in the valleys water is obtained at moderate depths, and wind-mills can be readily employed. This suffices for the family, the cattle, and the gardens of the farmer. His grain crops do not need summer water, nor do his fruit trees when once well rooted.

### CONTRASTS.

The farmer's life in California is unlike that of the Atlantic States. The long summer's drought creates a vast deal of dust, which is sometimes very disagreeable. It covers nearly everything around with a coating that lasts from May to November, and penetrates every crevice. The earth is almost everywhere alkaline, and the dust affects the eyes and air passages. Traveling is rendered very unpleasant. Flies and mosquitoes prevail. In the rain season the mud is equally uncomfortable, and wagoning is nearly impracticable. Farms are generally much larger here than at the East and neighbors are far apart. Good water is rare and most of it is alkaline. The absence of barns and the small dwelling houses strike the stranger's eye. But, more than all, there is an apparent want of comfort, which is, however, incident in a measure to all new settlements. This is greatly heightened by the absence of shade trees. Scarcely a tree is to be seen in most of our broad agricultural plains; and, intent only on making money, few plant trees for shade or ornament. This will change soon, for trees can be grown with ease and unexampled rapidity, and now that the farmers of California are almost universally in easy circumstances, many of them have money to spare for this purpose.

Groves of trees, ornamental shrubbery and roadside shade, may be sprung upon the landscape with magic speed in this climate. Here and there are proofs of the sudden changes made in the whole face of a neighborhood in this way. San José and Santa Clara may be given as examples. So that the repellent features spoken of are solely owing to our own temporary neglect.

Running brooks and green summer fields we cannot have, but in the rainy season, six months of brilliant green covers the whole face of Nature, from dale to mountain top. Instead of the snows and frozen ground of the Atlantic States, the eye is charmed with the most inviting of pictures. This feature, so unlike the Atlantic States, and the mildness of the season, which cannot be called winter, will strike our readers abroad as a full compensation for all the summer peculiarities we have fairly stated.

### ADVANTAGES.

Among the minor advantages to farmers, enjoyed in California, a few may be mentioned. They are not obliged to work half the season of summer to provide food for carrying their stock over winter. They save three quarters of the expense of fuel needed in the Atlantic States under the present system. They have no cattle stables to clean, no manure to cure, haul, and spread. Our mild winters lighten the work and exposure of women. Vegetables of every kind can be had fresh from the garden all the year, with very trifling shelter for a short time in winter. Fruit is and ever will be plenty and cheap. The two latter items are great promoters of health as well as economy. Fowls pick up their own living all the year. Though the country is bare of trees, the new settler may have shade and ornament in four years equal to what he is accustomed to expect in seven elsewhere, for tree-growth is very rapid, and it has little interruption in winter. His home may have flowers trailing around it all the year by very little attention. Thus, though at present the settlers give little or no care to such things, it is in the power of those who choose, to attach their families to their homes, and give them a settled and contented feeling, which the immigrant should study to cultivate. In no other country are the elements so favorable to them in this respect.

### FARM LABOR.

In no other part of the world do farm laborers receive such liberal wages, or fare so well, as in California. Wherever practicable labor-saving machinery is introduced, materially lightening, in many cases, the burden of his manual toil. In driving the gang-plough, now coming rapidly into use, he performs what was before one of the hardest services of the farm, with very little physical exertion, being comfortably seated and riding along, with no other labor than that required to guide his team and guage the easily managed machine. The wages of a good farm hand are from twenty-five to thirty dollars per month the year round, or from fifty to sixty dollars during the harvest season, board and lodging included—the former always good, and the latter, considering the mildness of the climate, generally comfortable. In the principal agricultural districts he is rarely ever pinched with cold, though there is much suffering from the excessive heat that prevails in the interior and southern portions of the State during summer. In the regions adjacent to the coast, however, there is little to complain of from the extremes of climate either way, while the whole country may justly be pronounced extremely healthy.

### HARMONY AMONG PRODUCERS.

The grain grower, the dairyman, the cattle ranchero, the shepherd, the orchardist, the viniculturist, each is apt to think he extols his own pursuit by comparisons unfavorable to all the others. They all combine to run down the miner ; and the speculator in city lots decries all industries as nothing in comparison with his business. The miner represents agriculture as a slow and toilsome way to make money; and the farmer tells you mining is all a lottery. This is a policy from which no profit comes to any one. Every man in California, every lot-owner in town, farmer and mechanic, has something to gain by every success that can be shown in whatever industry; and everything that he exhibits as a failure, is a loss to the general reputation of California's industries, a portion of which attaches to his own. Take away agriculture and mining would suffer terribly. Close the mines and the farmer's best home market would be lost. Remove both and San Francisco would soon lose its present proportions and the great prospects ahead.

## VINICULTURE.

If there be any one vegetable growth which more than any other finds a congenial home over hill and dale and high mountain ranges in California, and which nearly every one plants, it is the grape vine. So general is the distribution that it is not easy to number the vines now growing. But there cannot be less than twenty-five millions of vines; and men of good judgment say at least thirty millions. Two thirds of these are the native Los Angeles grape. It is a good bearer and never fails. Its berry is the size of a large musket ball. From this hardy grape are made, by varied processes, White Wine of the hock kind, Claret, Port, Sherry, Madeira, Champagne, Angelica, and some others.

Many viniculturists are cultivating foreign grapes of all kinds, aiming to make finer varieties of wines that will pay them better. The most prominent are Black Hamburg—a fine claret maker; Reisling, for hock wine; Chasselas, for light sauterne; Isabella, Catawba, Muscat, Tokay, and Tinto. The Zechfenthal is a new variety coming into great favor. Every grape is capable of being made into several varieties of wine. Catawba is chiefly esteemed to impart boquet to other wines; alone, it is rather rank. Thirty to fifty other varieties, now on trial, might be enumerated.

Mr. John Perèira (a Portuguese), at Jamestown, Tuolumne county, has a luxuriant growth of choice vines from the Island of Madeira, yielding wine of delicious flavor—the leading varieties being Tinto, a dark red berry; Malvizia, a large yellow berry; Verdeilho, golden yellow fruit, and the Bualo, also a yellow berry. This gentleman has one hundred and sixty acres of hill land in orchard and vineyard.

In a vineyard at Folsom, there are nearly sixty acres of very choice grapes devoted exclusively to making select wines, and a ready market is found for twenty thousand gallons annually.

We mention these vineyards, because their extent shows what is being done in wine making in the midst of the mines, and far from what are the great wine centers.

Fully one half our vines are in lowlands, as it was supposed they would there stand drought best. This is found to be an error. Everywhere on the steep hills of the interior the vine grows and thrives without irrigation. Many have watered, but every year the practice is being abandoned as not only unnecessary but harmful to the vigor of the vine and to the fine flavor of its wine. Once fairly rooted, the vine stands the summer's long drought better than any other plant ; but if taught to depend on artificial watering it is divested of its natural instinct, which directs it to send down its pump-root to the line of perpetual moisture. The superior flavor of mountain wines is tending unmistakably to transfer the culture to the cheap and ample ranges in which our gold mines are situated. There are three distinct wine districts in California : first, the southern, or Los Angeles, making Port and other sweet wines, and white wines of much spirit and little aroma; second, the Coast Range, including Sonoma, Napa, etc., making white and red acid wines—Hock, Sauterne, Claret, etc. ; third, the foot-hills of the Sierra Nevadas, in the gold mining range, including Folsom, Sonora, El Dorado, etc., making dry wines of extraordinary bouquet and aroma—Sherry, Madeira, Teneriffe, etc. ; also, Port and German wines, the latter having a high aroma unlike any Rhine wine.

The average number of vines to an acre is about nine hundred, which make generally eight hundred gallons of wine, and twenty of brandy from the residue. In France, three hundred gallons of wine, and four to five gallons of brandy are made per acre. The predominance in Europe is acid ; in California, saccharine matter. In one hundred pounds of California must, we have twenty-five to forty pounds of sugar ; in Europe, fifteen to twenty pounds.

In California no doctoring is done, no flavoring, no coloring, no sweetening; but some brandy is added from the same grape to some of the sweet wines. Nothing can be procured for adulteration that will not cost more than the pure juice of the grape. So that all dealers and consumers abroad may be quite sure that wine leaves California in perfect purity.

The product of California wine for 1866 was about 2,500,000 gallons, and brandy 150,000 gallons. For 1867, it is estimated at 4,000,000 gallons of wine and 400,000 of brandy, the reduction of the excise tax having increased the production of brandy.

Grapes are usually bought by the wine maker, and delivered at his press clean for seventy-five cents per one hundred pounds. In one thousand pounds scarcely one pound of unripe or rotted berries has to be cut out from the bunches. It is a great saving of labor over what is customary even in most favored places in Europe. Besides, it is an earnest of our wines being better, for where a notable proportion needs such culling, there is much passed to the press as not imperfect enough for rejection which is not perfect. The dealer pays the producer twenty-five to forty cents a gallon for new made wine, without packages. There has been no failure of the grape crop in any year of our experience ; and vines seventy years old at the Mission vineyards are healthy and fruitful as ever.

The vine suffers nothing from elemental disturbances. It is not mildewed nor storm-stripped; nor does it need leaf-pulling to give sun to ripen the grapes. Stakes are used but a short time; soon the vine acquires great size of stem and stakes are dispensed with. In appearance, the vine in fruit is like an umbrella opened out. The vine diseases of Europe are not known here. But a microscopic grasshopper, heretofore infesting the alfilerilla grass, has in some localities, as at Cache creek and Sonoma, begun to leave the grass as it dies and to take to the vine, resting by day under the leaf, and at night feeding on the upper side. It destroys the bearing power, and must finish the vine at last if no remedy be found. It is yet not so much known as to arouse invention to seek for remedies. Spring frosts seldom affect the vine here. Manure is not used. The soil is almost everywhere strong in the elements required by the vine—it being more or less volcanic, especially in the foot-hills. In the third year the vine begins to be profitable, and in the sixth and seventh year it becomes a strong bearer, needing no attention for winter protection.

Wine matures fast in this dry, warm, evaporating air, and in three years it has the age of eight years in Europe. Dealers usually hold it till the third year before tapping it for sale. The wines of California have so little free acid that they are easily preserved. The planting of vines has run far ahead of the wine-making facilities.

Four fifths of the wine of California is consumed in this country, and this does not pay enough to encourage the desired expansion of wine factories just yet; but everything is promising us a large export demand, which, in fact, has already set in. However superior our wines, their unaccustomed taste demands time to induce a change and for a new flavor to obtain preference. Considering this very great difficulty in the way of progress, the California wines are gaining favor with unexampled speed, which ought to satisfy us.

The white wine or hock of Los Angeles and Sonoma has very much the largest sale East. Germans and other Europeans are also showing a preference for it. The yearly sale is five hundred thousand gallons now, and it is increasing full thirty per cent. annually. It is a decided success, and the broad base now established is reliable for permanence. The price is highly remunerative.

Port wine, from the foot-hills back of Los Angeles, and from the Mission grape, has also found great favor, and the sales in New York for 1867 amounted to one hundred and fifty thousand gallons, at paying rates. This wine suits the American taste, takes well in Canada, and orders for it come to New York from Denmark and North Germany. Russia has not been tried, but they who best know the taste of that country, are quite confident of its success there. London dealers pronounce favorably, and an eminent house offers a good paying price if San Francisco parties will send not less than two thousand pipes a year and give exclusive control. It is pronounced fully equal to good Oporto, and at five years old equal to eight there.

It may be noted that there is a very great difference in our port wines. In many localities the grape is not as saccharine as it should be for a sweet wine, and in some places the spirit in the wine greatly exceeds the ordinary standard. All this will soon require distinct brands.

The wine third in demand is Angelica, the sales in New York now reaching eighty thousand gallons yearly, and increasing very fast. It should be understood that this is not confectioned, a small quantity of brandy from the same grape merely being added.

The fourth in order of sale is sherry, and it bids fair to grow in favor. The fifth is sparkling champagne, and from the excellence this wine has attained in the experiments already largely made, we have no doubt a brilliant success awaits it. Dealers are making ready for a greatly extended market. The sixth and seventh in order are muscat and claret. They are good wines, but not yet sufficiently tested in the Eastern markets. Many varieties of exceedingly rare kinds give also assurance of their finding favor whenever made known.

The wines of California most resemble those of Spain, Hungary, Greece, and Cape Constantia, rather than those of France, Italy, and Germany. But we shall not probably make our best wines till we cease to strive for foreign imitations, and strike out boldly for the manufacture of new kinds of wines, which will better bring out the excellencies with which Nature has no doubt enriched the grape in this peculiar climate.

California wines, at the French Exposition, attracted the admiration of the jurors. Their judgment was that they are so unlike wines of known European brands as to render comparison difficult; but they were struck with their fine fruity flavor, their rich body, and the ripeness attained in so short a time. They expressed an idea that, judging by the merits of our production, and our inexperience, with elements so fine as our grapes possess, that we must soon succeed in rivalling the wines of Spain, Hungary and Germany. We have the judgment of the people of Chicago on the dry wines from El Dorado county still more decided, for they are taking all that are sent to them.

### TO RIPEN AND PRESERVE WINE.

In the days of Pliny the Romans used to subject their wines to a warm bath. A French expert reports to his government that, by immersing wine in bottles in a water bath of 130° for a short time, the minute vegetable fungus that generates acid is destroyed, the wine mellows immediately, as if it had age, and its condition is preserved indefinitely.

Our brandy has already won decided favor, and, judged by the standard of taste in New York, it is superior to Rochelle, and may in time supplant all French brandies. The orders and prices for 1868 indicate an export demand for one hundred thousand gallons. New brandy is taken by dealers here at $1.50 to $2 a gallon—excise tax paid.

We have said enough to show that the viniculturist of California has good prospects before him—but he is not, as yet, making much money. He has planted too fast. His vineyard is growing more valuable by the steady development of his plants, and, from the way our wines and brandies are taking the market, it will not be long before capital will feel encouraged to put up central wine manufactories and vaults that will use up the vast crop of grapes now being produced. Already there are some wine vaults in San Francisco containing each over a million gallons of wine ripening.

It would probably be better for new comers to buy vineyards already growing, and go into farming as an adjunct at present. It is not the case here as in France and Germany, where twelve to twenty acres of vineyard are considered a rich heritage, though it may be so a few years hence. A small amount of money will buy such a vineyard here at this time. We have presented facts sufficient to show that wine can be made cheaper in California than elsewhere, and probably of better quality; and it is fair to presume that within the next three years there will be a great advance in vineyard property.

### WINE MERCHANTS OF SAN FRANCISCO.

One of the most prominent dealers is the pioneer house of Kohler & Frohling. They have also a house in New York, (Perkins, Stern & Co.,) and also agencies in Boston and Chicago for the sale of their wines. This house embarked in the business in 1854, and by persevering against great difficulties has now established a reputation and a business that is likely to become very profitable. They are successfully extending the preference for California wines far and wide. The article procured of them may be depended on for purity, as they do not adulterate at all. They have one million five hundred thousand gallons of pure California wine in their vaults in San Francisco. Mr. Kohler, of this firm, has been styled the Longworth of the Pacific.

The Buenavista Vinicultural Society, and I. Landsberger, make a specialty of champagne wine, and the quality and purity of their wines are now established. M. Robert of New York represents the former, and is also agent of Sansevain Bros. of San Francisco. Jackson & Wetherbee, of the El Dorado Mountain Vineyard, have a house in Chicago where most of their wines are sold. The Anaheim Company of Los Angeles, make excellent wines and have vaults in San Francisco. All these houses sell only pure wines, and they are every way reliable.

There must be in California at this time, including the last vintage, at least five million gallons of wine—a fact sufficiently indicating the magnitude which commerce in this article is likely to attain in the early future.

## SILK CULTURE.

The mulberry tree thrives wonderfully in our soil. The State of California has offered a premium of two hundred and fifty dollars for every five thousand trees, to be paid for when they are two years old, besides a premium on cocoons of three hundred dollars for every one hundred thousand—the object being to aid silk-making in becoming a fixed industry. Enough has been done on a large scale, in different localities, to prove that our mulberry leaves, our silk worms, our climate, and the silk we make, excel other silk countries in all these particulars. According to the opinions of parties most conversant with the subject, the mulberry trees now set out, and growing in this State, number about four millions—the production of eggs keeping pace with this extensive planting. But the foreign demand for our eggs is becoming so large that it threatens to retard the immediate extension of silk making in this State. In France the worms suffer so from disease that large orders from that country for our more healthy eggs are constantly being filled—a condition of things that promises to last for some time. So long as this call is kept up the manufacture of silk must necessarily be curtailed, as the selling of the eggs will be found more profitable than making the fabric. Italy and Mexico are also sending here for eggs—and while these are more healthful, producing more vigorous worms, the cocoons of California are also larger than those of other countries. The white cocoon worm of Japan, and the yellow of China, are found suitable to our climate.

California has peculiar advantages for silk growing, some of which are here presented, since they are so thoroughly proven as to be reliable in every particular. The white and black mulberry, and every other kind thrives here. But Mr. L. Prevost, of San José, selects the *multicaulis*, (much-leaved), the white, and particularly the Moretti, (large and thick leaves), for the superior silk it makes. In this climate the mulberry tree displays the same instinct as all other trees, its first strong movement being to send down its tap-root to the seat of permanent moisture. It is thought that in seasons of ordinary winter rains irrigation will not be necessary—without it, the worms will be better, and the strength of the silk greater. The mulberry attains a growth here in three years equal to five years in France, and the yield of leaves is much greater. It throws out a vast exuberance of branches, and has such power of recuperation that Mr. Prevost has adopted a new plan for gathering the leaves, which saves three fourths of the labor required in France, and is a very great improvement to the convenience of the worm, and in preventing waste of leaves. He does not pluck the leaves, but cuts off whole branches. This gives the worm spacious and cleanly feeding-way, keeps the leaves fresh, and saves them from being soiled. The tree is not at all injured, when judgment is used in limiting the cutting. This is the practice in Japan.

It will scarcely be credited abroad, but it is a fact, that cuttings planted in winter do yield leaves enough in the following summer for no mean amount of food suitable for the younger worms. The shoots from one year's growth are usually ten to twelve feet long—fifteen feet often. In three years from the time of planting the cutting, the mulberry tree in this climate is fit for regular cropping.

### COCOONS.

Two crops of cocoons are raised in the year, viz., in May and July, the whole process requiring six weeks. Artificial heat is not needed. There are no interruptions in this climate from thunder storms, or wet and cold spells, which kill so many worms in Europe, shorten the production, and injure the silk. For upon the unbroken continuity of the process depend the amount and the quality of the silk the worms make. Nothing does more damage to quality than cold checks. They are like cold nights upon cotton, making the fibre short and brittle.

The use of kilns for destroying the insect in the cocoon is dispensed with here, the summer sun sufficing. The cocoons are placed in troughs with a glass covering, and exposed for two or three days, which is effectual.

Of all industries, the rearing of worms and reeling silk from the cocoon is the most simple, the least laborious, and least monotonous. It requires in the climate of California the smallest outlay for shelter and for starting. The worm has no diseases, there are no wet spells to injure the leaf, and no cold snaps to check and mar the work. Land here is cheap, and growth is so exuberant that there is no incentive to push the tree into unhealthy bearing, the result of which has been so fatal to the worm and the silk in France.

The extraordinary advantages of our climate have attracted the attention of silk men in Europe, and we are advised that the immigration of such persons in considerable numbers is probable. Everything points to a very early expansion of silk making here, and it is quite clear that California is destined to be one of the foremost manufacturers of silk fabrics for the consumption of the world.

### DISEASES OF SILK WORMS.

As yet there are no diseases in the cocooneries of California. The only pest is ants, which attack and destroy the worms, but they are readily avoided, by keeping the legs of the stands in water. But in order not to be led into French errors, which have bred disease, it may be well to mention the cause of its introduction in France.

Firstly: A system has been pursued there for some years, under the guide of science, of forcing the trees "to give all their vital powers to the production of greater leafage." This is done by just such artificial substitution for the natural law of growth as is applied to grape culture. Pruning knives and close stripping of the leaves have wrought the mischief. So, likewise, depending solely on varieties which make greater weight of leaf, not sufficiently regarding the health and quality of the food nor the strength of silk it makes.

Secondly: Selecting eggs from the biggest cocoons only, year after year. The law is the same for all living organisms. The silk worms of France have lost their vigor—they can no longer stand a thunder storm—they cannot clear the silk they spin of the surplus silicious matter, which in delicate humanity cumbers the kidneys and is an obstacle to every function of the bodily organs. This is the cause of the "cutting" of modern silk fabrics, and the absence of the enduring silk dress goods of former times.

# CHAPTER VI.

## GEOLOGY.*

General Outlines of Topography—Geology of Coast Ranges—Monte Diablo Range—Coal Beds—Peninsula of San Francisco—North of San Francisco Bay—South of Monterey Bay—Southern End of Tulare Valley—Geology of the Sierra Nevada—The Great Auriferous Belt—Southern portion of the Gold Field—Mariposa County—The Fremont Grant—Mining—Tuolumne County—Table Mountains—Fossil Remains—Calaveras County—Union Copper Mine—Gold Mining—Amador County—El Dorado County—Placer County Nevada County—Sierra County—Plumas County.

The main physical features of the State of California are so prominent, and arranged upon so grand a scale, that a general view of its topography is essential to a proper comprehension of its geology. The coast line stretches in a northwesterly direction from about the parallel of 32° 30', to that of 42° north latitude. It is but little broken up, the most marked indentation being the Golden Gate, the outlet of the bay of San Francisco. The State has a nearly uniform width, from east to west, of two hundred miles. A great central valley, having its longer axis in a direction northwest and southeast—that is, parallel with the general trend of the coast, is inclosed and bordered by the Sierra Nevada mountains on the east, and the Coast Range on the west. The northern end of the valley is formed by the junction of these two mountain ranges near Shasta City (latitude 40° 35′), and the southern by the union of the same, near Tejon Pass (latitude 35°). North and south of these two points it is solely for geological considerations that the line of demarcation, between the Sierra and Coast Ranges can be drawn; for, topographically, they are one and the same.

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* In the preparation of this chapter the following authorities relative to the geology of California have been consulted, viz.: Reports of the State Geological Survey: Prof. J. D. Whitney; Pacific Railroad Reports; Geological Reconnaisance in California: W. P. Blake; Placers of the Middle Yuba: Prof. B. Silliman; De la Production des Métaux Précieux en Californie: P. Laur; and Proceedings of California Academy of Sciences. To the former of these, as being the only work based upon a systematic survey of the State, we desire particularly to acknowledge our indebtedness.

The crest of the Sierra, which is marked by a long and nearly straight line of culminating peaks, extends from Mount Shasta to the Tehatchaypah Pass, a distance of nearly five hundred miles.

The ascent from the great central valley of California to the summit of the Sierra is comparatively easy and gradual, but the eastern slope of the chain is bold and abrupt, and forms the western wall of that vast sterile tract of country included between the Rocky Mountains on the east and the Sierra Nevada on the west, in which are the great silver mines of Nevada.

The Coast Ranges are not so strongly marked by any one line of dominant peaks, but form a broad belt of mountains bordering the western part of the State, made up of minor ridges having a general parallelism of trend to each other and the coast; between which, particularly south of the bay of San Francisco, are included long and narrow valleys remarkable for their productiveness and salubrity.

The great central valley, which, with its bordering mountain chains, embraces the middle, larger, and by far the most important part of the State, is drained by the Sacramento and San Joaquin rivers. These are the main commercial arteries of California; furnishing, as they do, the means of rapid and cheap transportation from the coast to the interior, both north and south. The former rises in the neighborhood of Mount Shasta and flows south, receiving numerous tributaries from the east, fed by the melting snows of the Sierra—the latter runs in a general northerly direction, having its corresponding affluents from the east, and both uniting at a point about midway on the western side of the valley, just north of Monte Diablo, discharge their waters successively into Suisun, San Pablo and San Francisco bays, and from thence through the Golden Gate into the ocean. This succession of bays is the only break through the Coast Ranges that extends from the great central valley to the ocean.

Our geographical and geological knowledge of the extreme northern and southern portions of the State is very limited. Both are thinly settled, and from natural causes have not received as large a share of attention as the middle and great gold producing section.

Having thus given a general view of the mountain chains, valleys, and rivers, we now pass to the consideration of the geological structure of the former, and of those facts which bear upon the mineral wealth of this wonderfully rich and favored State—a subject that demands far more than the limited space at our disposal, but of which the most important facts and salient features hitherto ascertained are here given.

## MONTE DIABLO RANGE.

Of the numerous minor mountain ranges which together make up the broad belt of elevations between the great central valley and the ocean, the one which has been most thoroughly studied, and furnished by far the greater part of the data upon which conclusions have been formed as to the geological age of the others, is the Monte Diablo range proper, extending from Suisun Bay on the north to Paso Roble, near Fort Tejon, on the south, a distance of over one hundred and fifty miles. To the consideration of the geology of this range, therefore more space is devoted than to that of either of the others ; and, further, because in structure and material it is in a high degree similar to them, being constituted of strata of the same geological age, and rocks similar in their lithological characters. Its eastern border, along the central valley, is well defined; but on its western side are numerous spurs jutting obliquely to the northwest, that form for comparatively short distances distinct local mountain ranges, but which are finally merged into the more continuous range known as the Monte Diablo, receiving its name from its most northern peak, which lies but little north of east from the city of San Francisco, about thirty miles distant.

This mountain, though not as high as others in the chain further south, being but 3,876 feet in elevation, nevertheless, from the comparatively isolated position in which it stands, and the extensive view to be obtained from its summit, is its most conspicuous peak. It is also especially important on account of the coal beds that occur on its northern flank, which are of vast economic value to the State, being the only extensive deposits of coal yet discovered within its limits.

The range, which attains an average elevation of perhaps three thousand feet, is marked by depressions occurring at rather short intervals, the most important of which is Livermore Pass, a short distance south of Monte Diablo, being the lowest (680 feet), and affording an easy route for a railroad connecting San Francisco with Sacramento —an important link in the future great continental thoroughfare. The mountain masses are almost wholly made up of cretaceous and tertiary strata, often extensively altered, and presenting instances of peculiar local metamorphism. The general trend of the range is northwest and southeast, but the rocks have almost every possible dip and strike. Eruptive rock is not a marked feature of the chain, but occurs at various points throughout its length.

Monte Diablo itself is made up of a central mass of metamorphic cretaceous rocks covering an area of twenty square miles, surrounded and overlaid by unaltered cretaceous strata, upon which rest conformably the miocene and pliocene divisions of the tertiary, the eocene being apparently wanting. In the examination of the metamorphic rocks of Monte Diablo, the passage of cretaceous shales into jaspery rock, and of argillaceous sand-stones into serpentine, is shown to great perfection, and is especially interesting, as these form such a considerable part of the rocks found throughout the Coast Ranges, and as it has been the means of identifying the age of rocks in other localities in which fossils are wanting or sparingly occur.

### MONTE DIABLO COAL BEDS.

The Monte Diablo coal beds are in the upper limit of the cretaceous, in a ridge on the northern flank of the mountain, and dip at an angle of from forty-five to twenty-six degrees to the north, the inclination gradually becoming less and less as their course is followed to the east and southeast, to the San Joaquin plains.

The principal mining center is at Somersville and Nortonville, (small towns separated by a narrow ridge,) about five miles distant from the San Joaquin river, and from eight to nine hundred feet above it. The mines at both places are connected with the river by railroads, which have been constructed for the cheap and rapid transportation of coal to a point of shipment by water, and are somewhat remarkable for the necessary high gradients and short curvatures employed. The workable beds are two in number, varying in width from thirty to fifty inches, and furnish a good article of bituminous, non-caking coal. The topography in this vicinity has permitted the mines to be opened by tunnels, and comparatively short inclined shafts. The total amount of coal shipped from them during the past year, 1867, is stated to have been 109,490 tons—38,168 tons being furnished by the Black Diamond Company's mines at Nortonville.

Within the past year developments of the same beds have been in progress upon the "Rancho de los Meganos," better known as the Marsh ranch, at a point six miles east from the mines above mentioned, just within the limits of the eastern foot-hills of Monte Diablo, and at an elevation of one hundred and thirty-five feet above the river. Here the beds are less inclined, and it is highly probable that fewer faults or dislocations will be found in working them in this vicinity than at Somersville, where their inclination is steeper and the disturbances have been greater. At this point, being at such a small elevation above the river, their exploitation involves the sinking of deep shafts, and the removal of considerable quantities of water by pumping—a difficulty which substantially constructed works and adequate machinery will overcome. The limited extent of our coal field renders this new development especially important, and it is probable that before long numerous collieries will be established east of the principal mines, which have heretofore furnished nearly all the coal shipped from the Monte Diablo beds.

In connection with the coal on the Marsh ranch, an extensive bed of superior clay occurs. This furnishes the material for the pottery established during the past year, at Antioch, on the San Joaquin river, ten miles distant. The success of the enterprise has been even greater than was anticipated, and these works are now producing large quantities of earthenware, as good, if not better, than that imported from the Eastern States, and at a lower price. Fire-brick have also been made from this clay, which, it is claimed, are equal in quality to the best "Stourbridge" brick.

In this connection it will not be out of place to suggest to the companies interested at Somersville and Nortonville, a combination of their interests, and the driving of a tunnel starting from the plains bordering the hills, and between them and the Sacramento river, at as low a level as possible, and running so as to cut the beds at right angles to their strike. Such a tunnel would probably not exceed three miles in length, would afford perfect drainage and ventilation for the mines, and would materially reduce the cost of their development and the extraction of coal. It should be wide enough for a double track or tramway. The expense of its maintenance would probably not surpass, if it should equal, that of two railroads with high grades and short curves, while the cost of transportation would be considerably diminished. Another most important consideration is the opportunity that such a tunnel would afford for working the mines to a greater depth than could otherwise be attained. The soft and friable nature of the unaltered rocks which overlie the coal beds would render the work comparatively inexpensive and easy of execution.

Analyses of the Monte Diablo coal, made quite early in the history of the development of the mines, show it to contain a remarkably small percentage of ash and sulphur, but a large amount of water. A marked improvement in the quality of the coal since the mines have been opened to a greater depth, and these analyses were made, is acknowledged.*

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* An analysis of Monte Diablo coal, from the Pittsburg mine, made in January, 1867, by W. P. Blake, shows the following result : Water, 3.28 ; bituminous substances, 47.05 ; fixed carbon, 44.90 ; ash, 4.71 ; no sulphur.

Both copper (chalcopyrite) and quicksilver (cinnabar) ores have been found in the metamorphic cretaceous rocks of Monte Diablo, but neither promises to be of future importance, as they occur in very irregular deposits of limited extent. Northwest, and in the vicinity of Monte Diablo, are extensive deposits of travertine or calcareous tufa, consisting of a very pure carbonate of lime, deposited from water of hot springs containing lime in solution, which undoubtedly existed at one time at the localities where they occur. The present expense of fuel and transportation prevents these deposits from being quarried and burned for lime.

### SOUTH OF MONTE DIABLO.

South of Monte Diablo, a depression in the tertiary hills, and extensive denudation, owing to the soft and unaltered character of the sandstone, form Livermore Pass. The strata on the east side dip to the northeast, and on the west to the southwest. Within a short distance south of this pass deposits of coal, known as the "Corral Hollow" mines, occur, and evidences of the approach to another metamorphic center are to be seen. The bed or beds attain a greater thickness than at Monte Diablo, but are more disturbed, and show numerous faults or dislocations. They stand at a high angle, and dip in opposite directions within a short distance. Attempts have been made to open these mines, but they have thus far proved unsuccessful. The coal here is at about the same elevation above tidewater as at the Monte Diablo mines.

From this point, going south to Pacheco Pass, a distance of fifty miles, the range rapidly rises, becomes broader and very rough, having many elevated points along it, the highest being Mount Hamilton, nearly east of San José, 4,443 feet high. The range then decreases in height to Pacheco's Pass, the loftiest point of which is 1,470 feet. Between Livermore and Pacheco passes the San Pablo hills on the east side of the bay, so prominently seen from San Francisco, become merged into the main Monte Diablo range.

South of Corral Hollow, on the eastern side, in the numerous cañons opening into the San Joaquin valley, the structure of the range is well shown. It consists of a center of metamorphic cretaceous rocks, flanked by an enormous thickness of unaltered cretaceous strata. The latter consist of sandstones, with interstratified shales. A coarse conglomerate, the boulders in which are of metamorphic rock differing from that composing the main mass of the mountains, occurs on the outer margin of the hills towards the San Joaquin plain.

These unaltered cretaceous and tertiary strata flank the entire range on the eastern side, as far north as its junction with the Sierra Nevada. The absence of the tertiary is marked by the precipitous nature of the range where it joins the plains, as opposed to the low rolling hills where the tertiary overlies the cretaceous.

Along the eastern flank, the tertiary, as far as known, rests conformably upon the cretaceous, as at Monte Diablo. The metamorphic rocks in this vicinity have the same general characters, being marked by jaspers, serpentine, and occasionally mica slate. Their limits are well indicated by the growth of forest trees, which is very meager upon the hills made up of unaltered strata, they being generally very dry and barren.

At the mouth of Lone Tree Cañon is an ancient terrace underlaid by cretaceous shales, and covered with deposits of gravel. The metamorphic center of this range extends south of San Carlos mountain, which is nearly the culminating point, and in the broadest part of the range—its height above tide water being 4,443 feet.

The summit of Pacheco's Peak, a little south of east from the town of Gilroy, as well as those of other and higher peaks, in a line crossing the range obliquely to the southeast, are of trachyte. This is the first known occurrence of eruptive rock in the main Monte Diablo Range south of Suisun bay. To the south, the tertiary belt on the eastern side appears to widen, and at a point a few miles east of the New Idria mine it is believed that the Eocene epoch of that age may be represented—which is notable as being, perhaps, the only locality of Eocene yet discovered in the State.

Cinnabar is found at various points in a line extending from San Carlos to New Idria, a distance of three miles. The deposits have been developed by the New Idria Quicksilver Mining Company, and have yielded, and are now producing, a considerable amount of metal. The mines are just within the eastern limits of the metamorphic cretaceous. The rocks are sandstones and slates, in various stages of metamorphism. The ore, which is largely intermixed with iron pyrites, occurs in these rocks in very irregular deposits.

In Monterey county, on Clear creek, an eastern branch of the San Benito—which, as is characteristic of the streams throughout the Coast Ranges, flows for some distance nearly in the direction of the stratification, then turning abruptly to the west, breaks through the hills in a narrow gorge, and joins the San Benito at a point about forty miles south of San Juan—are other deposits of cinnabar extending, over a distance of two or three miles to Picacho Peak, some ten or twelve miles west of San Carlos mountain. This line is marked by very bold and massive outcrops of the peculiar silicious rock, known throughout the Coast Ranges as "quicksilver rock." It is often highly discolored, by decomposition of iron pyrites probably, and traversed by veins of pure white quartz, affording most beautiful specimens of chalcedony, often with most exquisite drusy surfaces of minute quartz crystals. This line of outcrops, resembling fortifications, as seen from a distance, crowning the summits of the hills, from its durable character has withstood the action which has disintegrated and removed the softer magnesian rocks which appear to inclose it, bringing them out into bold relief. It is understood that developments are now in progress, with, however, the doubtful prospect that must ever attend the search for ore which occurs in such uncertain and irregular deposits as cinnabar. Should they prove successful, the locality is in every respect favorable for its economical reduction in close proximity to the mines, wood and water being abundant, conditions that are not as favorable at the New Idria mines farther east.

The San Benito valley is long, narrow, and nearly straight, and separates the Gavilan from the main Monte Diablo Range, for a distance of about seventy miles. The stream of the same name has its main sources in their point of union. The rocks occurring along its course are generally metamorphic and largely magnesian; frequent enormous land slides in the hills bordering the eastern side of the valley are seen to have taken place quite recently. During the dry season, the stream, which is small, appears only at intervals of ten or twelve miles, and the water is strongly alkaline to the taste. Near its sources it flows a constant and steady stream of good water.

Not far from the quicksilver deposits just mentioned, and the San Benito river, large masses of chromic iron are found. This ore of chromium also occurs between New Idria and San Carlos, in enormous masses, and, in fact, led to the discovery of the quicksilver mines. It is not unlikely that the San Benito mines are but the extension of the New Idria deposits farther east.

On the Arroyo Joaquin Soto, an eastern branch of the San Benito, further north, are enormous deposits of post-tertiary gravel, in some places greatly disturbed, even dipping vertically—a fact which is very interesting, as an illustration of how recent and extensive disturbances have taken place in the Coast Ranges. Terraces, in one instance five in number, are found in this cañon, which Prof. Whitney remarks in his report, seem to have been formed by successive elevations rather than by gradual erosion at the mouth of the valley.

The tertiary is more extensively developed on the western than on the eastern side of the Monte Diablo Range, towards the north. The hills bordering the San José valley on the east belong to this period, and are from one thousand to twelve hundred feet in elevation. The rocks are highly altered in places. A tertiary ridge extends to the northwest, separating San José and Calaveras valleys.

### THE CONTRA COSTA HILLS.

The Contra Costa hills, so marked a feature of the scenery to be observed from San Francisco, are separated from the main Monte Diablo Range, first by the San Ramon, and farther south by Amador valley, and extend from the Straits of Carquinez to the southeast about fifty miles, joining the main range in the vicinity of Mount Hamilton. They are made up principally of unaltered cretaceous and tertiary strata, though a broad belt of the latter forms the mass of the hills. A belt of highly metamorphic rocks, rarely over two miles in width, extends from San Pablo to the southeast, a distance of thirty-five miles, forming the summits of the highest peaks, 1,500 to 2,000 feet in elevation, in the vicinity of the pass leading from Oakland to Lafayette. Near Redwood Peak this belt branches, one fork continuing to the southeast, finally unites with the central metamorphic mass of Mount Hamilton, the other skirting the western slope towards Alameda Cañon, where but traces of metamorphism are to be seen.

The rocks are similar in lithological character to those of Monte Diablo, and when metamorphosed, to those of known cretaceous strata near Martinez, on Suisun Bay, which consist largely of jaspery slates, and are marked by the occurrence of serpentine and the silicious ferruginous rock which occurs throughout the Coast Ranges in connection with cinnabar. Chromic iron also occurs in considerable quantity east of the town of San Antonio ; and although it has been mined to some extent, its present distance from a market would preclude the possibility of its being profitably worked.

Unmistakably eruptive rock occurs at points throughout this metamorphic belt, though it is often difficult to distinguish between eruptive and metamorphic, on account of the high degree of alteration which both have undergone.

There is but little regularity of strike and dip of the strata forming the Contra Costa hills ; in their northern part they form a well defined synclinal axis, as is shown by the section given on page 14 of the report on Geology of California, and taken between a point on the road from Martinez to Pacheco, and the Cañada del Hambré, in which the tertiary sandstones are represented as resting conformably upon the cretaceous.

In the San Ramon valley are evidences of very recent disturbances; fissures in the soil are said to exist which were formed during the earthquake which occurred in the month of June, 1861.

Near Martinez, and for some distance west, along the shores of Suisun Bay and the Straits of Carquinez, cretaceous strata are well exposed, consisting of sandstones and shales, the latter with intercalated deposits of argillaceous limestone, varying in thickness, sometimes attaining a width of three feet or more.

The upper limit of these strata is marked by the occurrence of sandstones resembling those accompanying the coal beds at Monte Diablo, which, though containing much carbonaceous matter, do not present indications of a regular coal bed. They are overlaid by the tertiary strata, resting conformably upon them, which form the mass of the Contra Costa hills. In the tertiary strata, near San Pablo, oil has been obtained by boring, though not in sufficient quantity to be of any commercial value. North of San Pablo are low hills made up of horizontal post-pliocene strata resting uncomfortably on the edges of the tertiary.

## THE PENINSULA OF SAN FRANCISCO.

This peninsula is marked by a high mountain range extending from the Golden Gate southeast as far as the Bay of Monterey, its connection with the Gavilan, previously mentioned as a spur of the Monte Diablo Range, being broken by the valley of the Pajaro river, which has its lateral branches draining the interior valleys both north and south. It is much broken, and cannot properly be called, as it sometimes has been, the Santa Cruz Range, though in Santa Cruz county it attains its greatest elevation and broadest development near Mt. Bache, and other high peaks in its vicinity. An almost unbroken front of mountains is presented towards the ocean, a narrow strip of table land alone intervening. Along the western shore of the Bay of San Francisco, however, is a considerable belt of level land which widens towards the south, and joins with the extension of that on the eastern side, forming the San José valley.

The geology of the belt of elevated land between the San José valley, the Bay of San Francisco and the ocean, is very similar to that of the Contra Costa hills, though it is rendered more complicated by the intrusion of granitic rocks. It is composed of the same cretaceous and tertiary strata, containing rocks similar in lithological character to those of Monte Diablo, which have already been mentioned. Fossils sparingly occur. A metamorphic belt extends from Redwood City to the southeast a distance of about forty miles, forming the eastern edge of the range and the summits of Mt. Bache, 3,780 feet in height, and of other high points. Limestone, in detached masses, occurs at several places throughout this belt; evidences of what was once, in all probability, a continuous limestone belt, are found at various places, from the summit of Black mountain, back of Mountain View, to as far south as the New Almaden mines, which lie in a ridge northwest of that formed by the metamorphic mass of Mounts Bache, Choual, and Umunhum. It is to be seen on Los Gatos creek, dipping to the northeast, and is less altered there than at other places where it is hard and compact, though not crystalline. To the west of the metamorphic belt above mentioned is a series of unaltered tertiary strata, forming a broad range of mountains extending northwest through Santa Cruz into San Mateo county, the culminating point of which is Mount Bielawski, 3,269 feet high. Southwest of this belt of tertiary, and stretching northwest, nearly to Pescadero creek, is a high range of granite hills, at places attaining an elevation of 2,900 feet, the relations of which to the adjoining strata have not been thoroughly investigated. A mass of gold bearing quartz is said to have been found in this range of granite hills, and to have yielded quite largely—no well defined veins, however, have been traced, and the deposits, when they occur, are not likely to prove of permanent value.

Beds of miocene tertiary extend along the coast from Santa Cruz to Spanishtown; these retain their original position along the shore, but are disturbed near the granite. The coast is also marked by the occurrence of terraces, indicating recent changes of level, which, though broken at intervals, are to be seen throughout the distance from Santa Cruz to Pescadero. No eruptive rock is known to occur on the peninsula north of San Mateo. The range becomes depressed as the Golden Gate is approached, and at the head of the peninsula we have a mass of comparatively low hills made up of highly broken and contorted metamorphic cretaceous strata, without any apparent regularity of strike and dip. The material of Telegraph, Russian and Rincon hills, sections of which have been well exposed by excavations involved in grading the streets of the city, is an argillaceous sandstone—in places highly altered and durable, but generally soft, and disintegrating rapidly on exposure to air and moisture. Jaspery rock occurs in the outskirts of the city, and has been employed to a considerable extent as a ballasting material for roads leading therefrom. A belt of serpentine extends from Fort Point, by Lone Mountain and Mission Dolores, to the Potrero. The peculiar silicious rock generally associated with ores of mercury occurs at various points, and in the vicinity of the Mission some cinnabar has been found. No building stone of value occurs in the immediate vicinity of San Francisco. On Yerba Buena Island, in the bay, one mile east of the city, the rocks are similar to those of Telegraph Hill, though a highly altered sandstone, having a trappean appearance is exposed on its eastern side in larger masses, or more heavily bedded than at the latter locality. This, to some extent, has been excavated and used for foundations of buildings in San Francisco, and is a good material for concrete intended for sub-aqueous structures; its extent, however, is very uncertain, and large quantities of softer material have to be removed in its excavation. A less metamorphosed sandstone, often streaked with thin veins of carbonate of lime, is quarried on Angel Island, north of the city.

The miocene tertiary is not represented in the vicinity of San Francisco, though in the low hills along the sea shore southwest of Merced Lake, strata belonging to the pliocene and post-pliocene epochs, which are unconformable with each other, are exposed. These also rest unconformably upon the metamorphic cretaceous.

By far the most interesting and important feature of the range under consideration, is the occurrence of the extensive deposits of cinnabar in the metamorphic cretaceous rocks at the New Almaden mines, a few miles southwest of San José, and lying in a ridge east of the main range, culminating in Mount Bache, the highest points of which are about 1,700 feet above tide water. The three mines—the New Almaden, Enriquita, and Guadalupe—are in line extending over a distance of about five miles; the former is by far the most productive. The cinnabar occurs in altered slates, inclosed by extensive masses of serpentine. The ore is very irregularly distributed, though the metal bearing portions seem confined to limited areas dipping with the strata. This is but one of the numerous localities throughout the Coast Ranges where cinnabar is mined, but thus far is the only one that has been worked with very great and continued profit to its owners.

On the western side of the island called Red Rock, which rises abruptly from the waters of the bay, about eight miles north of San Francisco, and attains a height of about 250 feet, there occurs a deposit of oxide of manganese (pyrolusite). This island is almost entirely composed of cretaceous jaspery shales. The ore is found, sometimes in quite large masses, irregularly distributed throughout a belt over one hundred feet in width, extending northwest and southeast across the island, a distance of between six and seven hundred feet. It is of excellent quality, containing a high percentage of binoxide, and is remarkably free from iron, lime, or other materials for which chlorine gas has an affinity. The ore is accompanied by a black, flinty gangue-stone, which is likely to be mistaken by the inexperienced eye for it, but which is of very much lower specific gravity, and is therefore easily sorted. Over two hundred tons, containing by analysis from carefully averaged samples over seventy per cent. of binoxide, have been shipped from this locality to New York, and sold for less than enough to pay freight and commissions. Although enormous amounts of bleaching powder, or chloride of lime, are consumed, nearly the whole of it is imported from England, its extensive manufacture having been but recently commenced in the United States. The demand for it in New York city is therefore exceedingly limited. The price of oxide of manganese in the English market during the past few years has ranged so low—extensive deposits having been discovered in Spain, from whence that market is supplied, as to preclude the probability of the pecuniary success of its being mined here to any considerable extent. The actual cost of its delivery at Liverpool will probably exceed its value in that market, or at any rate equal it.

The rapid introduction of the chlorination process in California, for the extraction of fine gold from the auriferous sulphurets, will create a limited home demand for the article. As an agent for generating chlorine for bleaching purposes, the paper manufacturing companies would probably find a considerable saving to result from its use. In the method at present adopted by them—the employment of bleaching powder—the lime merely serves as a vehicle of transportation for the chlorine, which has already been generated by means of oxide of manganese. Other deposits of pyrolusite occur in the metamorphic cretaceous rocks, but they are apparently of very limited extent, and not likely to prove valuable.

### NORTH OF THE BAY OF SAN FRANCISCO.

The valleys included between the Coast Ranges north of the Bay of San Francisco, though numerous, are generally smaller and narrower than those to the south of it. The mountain ranges are but a continuation of those already described, and are made up of rocks of the same general character—silicious and jaspery rocks predominating, and serpentine occurring in enormous masses, though volcanic rocks and materials play a much more important part than in the ranges south of Suisun bay.

Tamalpais, a conspicuous mountain on the north side of the depression which forms the Golden Gate, rises quite abruptly to an elevation of 2,597 feet. Its summits, of which there are three, consist of metamorphic sandstone, in some places marked by quartz veins having a banded structure. Heavy masses of serpentine occur on its western and northern slope. A ridge of this material, nearly 2,000 feet high, extends several miles to the northwest. A short distance west of the town of San Rafael, is a mass of trachyte extending some distance east and west.

Three quarters of a mile southwest of Petaluma, a belt or dyke of compact basalt occurs. In places it has a columnar structure, and is about two hundred yards in width. It has been used to some extent as a building material at Petaluma; its hardness, and the difficulty of obtaining stones of large size, render it undesirable for that purpose; but it makes a durable material for ballasting roads, or a concrete for submarine construction, this being the most accessible point to the city of San Francisco, where such material can be obtained in large quantities. Eruptive rocks also occur at points between Petaluma and San Rafael, but not as favorably situated for shipment as the basalt near Rudesill's Landing.

Between Tomales bay and Petaluma is a line of marked depression. In the vicinity of Tomales, the miocene tertiary, undisturbed and resting conformably upon the cretaceous, is represented. The belt of granite, which occurs on the west side of the peninsula of San Francisco, appears at the extremity of Tomales point; at Punta de los Reyes, which is wholly composed of it, and at Bodega Head, farther north. Limestone is associated with granite and mica slates at the head of Tomales bay, and it is probably the continuation of the belt which traverses Santa Cruz and San Mateo counties.

Mount St. Helena, 4,343 feet high, at the head of Napa valley, is, with the single exception of Mt. Hamilton, the highest summit between San Carlos to the south and the higher regions to the north. This mountain seems to have been the source of the volcanic materials, which are spread over a large area of country to the east and southeast of it. A belt of eruptive rock extends from the west side of Clear Lake through to Suisun Bay. Hot springs, which have an extended reputation for their curative qualities, are numerous, especially in the vicinity of St. Helena, and Clear Lake. North of St. Helena are several localities where cinnabar has been found and mined to some extent.

Perhaps the most important development is in Pope Valley, three miles northeast of Mt. St. Helena. The rock, an imperfect serpentine, sandstone in the process of metamorphism, is the same as is usually associated with the ore. At the Lake mine, about eighteen miles from the southern end of Clear Lake, on the Suisun road, the ore is peculiar, on account of its association with sulphuret of antimony in acicular crystals and granular masses, as well as by reason of the absence of the peculiar silicious rock with which cinnabar is generally found. It is deposited in lenticular masses in cretaceous shales.

The locality known as the Geysers is half-way between Healdsburg and the southern end of Clear Lake. The wild scenery, and the phenomena exhibited by the hot springs occurring there, make it an attractive and interesting locality to visit; but there exists no analogy between these and the Geysers of Iceland. The waters hold a variety of salts in solution, which give rise to numerous chemical reactions when waters from different sources are brought in contact, and produce vivid colorations of the rocks. These are chiefly sandstones and silicious slates, the silica of which is thoroughly leached out by hot alkaline solutions, and afterwards forms extensive deposits. Considerable quantities of sulphur are also deposited by the water from these springs, and the deposit known as the Sulphur bank, in the vicinity, may prove of future value.

One of the most interesting and curious portions of the Coast Ranges north of the Bay of San Francisco, is that in the neighborhood of the southern extremity of Clear Lake. It is in this vicinity that the celebrated and productive deposits of borax, or biborate of soda, occur beneath the waters of Borax Lake. This is a sheet of shallow water, the average depth of which is about three feet, comprising generally about one hundred acres in superficial area, but varying greatly in size with the seasons, as the shores are low, and their slope towards the water is very gradual. The water of the lake is impregnated with borax; analyses of it, made in 1863, show that it contained 2401.56 grains of solid matter to the gallon, about one half of which was common salt, one quarter carbonate of soda, and the remainder borate of soda, there being 281.48 grains of anhydrous biborate, equal to 535.03 of crystallized borax to the gallon. A sample taken from the interior of a coffer dam, from water percolating through the underlying mud, was found to contain a much larger portion of solid matter, but in the same proportion as before. The borax being the least soluble of the prominent ingredients, has crystallized out, and is found in the mud in crystals of various sizes, from two or three inches across, to those of microscopic size. That the process is rapid and still going on, is shown by the coating of crystals formed upon sticks of wood, which have been immersed in the waters of the lake for but a short time. The principal deposit of the crystals is in a layer of blue mud of varying thickness, beneath which is mud without them.

Northeast from Borax Lake, and about a mile distant from it, on the borders of Clear Lake, is an extensive deposit of sulphur, where solfatara action is yet apparent. The volcanic rocks have been extensively fissured, and through the orifices and seams, steam and sulphurous vapors are constantly issuing. A large amount of sulphur has been deposited, the extent of which is uncertain, and can only be demonstrated by the pick and shovel, though it occurs over an area of several acres. The most interesting fact in connection with this deposit is the association of cinnabar with the sulphur, sometimes distinctly separated from it, in quartz evidently deposited from solution, but often thoroughly intermixed with it.

Another large deposit of sulphur, about two miles distant, occurs on what is locally known as Chalk Mountain, so called from its peculiarly white appearance, and still another at the Sulphur Springs, further east, on the road to Colusa. At neither of these localities does the sulphur appear to be contaminated with cinnabar, which marks the deposit on Clear Lake. At the latter locality, which promises to be much more extensive than was at first supposed, a good merchantable article is being produced, in considerable quantities, by simple distillation. The rocks at Chalk Mountain are extensively fissured, and much decomposed, by the action of steam and acid vapor, giving them a white and chalky appearance. The deposit here promises to prove extensive, at least large superficial areas of it exist; how deep they will prove, or how large a quantity of sulphur they will yield, is of course a matter of uncertainty. Springs yielding carbonated water are numerous in the vicinity of Chalk Mountain—it is often very agreeable to the taste.

Volcanic materials and hot springs occur on a line from Clear Lake east towards the Sacramento valley—and, as Prof. Whitney remarks, there is every evidence of a transverse fracture extending from the Geysers across the volcanic belt, of which Mt. St. Helena is the culminating point, to the Sacramento valley.

A curious association of gold, cinnabar, and bitumen occurs in what is known as the Manzanita tunnel, near Sulphur Springs, on the road from Clear Lake to Colusa. Beds of hydraulic limestone occur in the cretaceous strata near Benicia; they occupy a position between the sandstones and the shales.

The beautifully variegated Suisun marble occurs in the sandstones of the Pelevo hills, north of Suisun. It is the deposit of calcareous springs, and cannot be obtained in masses of sufficient size to make it very important as an ornamental stone.

## SOUTH OF MONTEREY BAY.

North of latitude 35° 20′ the trend of the mountain chains forming the Coast Ranges is quite uniformly northwest and southeast, agreeing very closely with that of the coast north of that parallel. South of this line, however, we have a very marked change in the direction of the coast. On the north side of Santa Barbara channel it runs nearly east and west, and near San Luis Obispo we have the northern limit of a system of upheavals, in a direction transverse to that which has determined the trend of the main Monte Diablo, and other ranges to the north.

The Santa Lucia mountains extend from Carmelo bay, near the town of Monterey, southeast in an unbroken line, bordering the coast as far as San Luis Obispo, then curving to the east, finally become merged into the main Monte Diablo Range. They form a mass of rugged and unexplored mountains, in places over 5,000 feet in elevation. The western slope of the range is peculiarly abrupt and inaccessible.

The comparatively broad valley of the Salinas river, included between the Santa Lucia and Gavilan mountains, stretches to the southeast from the Bay of Monterey, a distance of nearly one hundred miles. The average breadth of the Santa Lucia range is about eighteen miles. Granite is known to occur throughout the northern twenty or thirty miles. Metamorphic tertiary rocks, and miocene and pliocene strata, highly contorted, also occur.

The Polo Scrito hills, between the valley of the Carmelo river and that of the Salinas, and the San Antonio hills further south, are made up of the great bituminous slate formation of the tertiary age, which extends through California as far north as Cape Mendocino; above which are more recent formations. Portions of the tertiary are highly bituminous, and asphaltum is of frequent occurrence. Well marked terraces occur on the Salinas and its branches—the San Antonio and Mascimiento rivers. Near San Luis Obispo the range has a fan-like structure. Gold has been found in very limited quantities, and, at various points, copper stains occur; argentiferous galena is also found, but neither is likely to prove of importance—no well defined vein having been seen.

The islands on the south side of Santa Barbara channel appear to belong to the east and west system of upheavals, and are probably of the same geological age as the Coast Ranges. South of San Luis Obispo is a succession of mountain chains, having an easterly trend.

The Santa Inez Range commences at Point Concepcion, stretching east a distance of over one hundred miles, and joins with mountain ranges south of Fort Tejon. East of Santa Barbara it attains an elevation of about 4,000 feet, but to the west it is lower, and at Gaviote Pass it is about 2,500 feet in height. The western end is composed of unaltered tertiary sandstones of miocene age. There the strata dip to the south; further east an anticlinal axis is shown, while still further east all the strata dip to the north.

Near Santa Barbara the sandstone, forming the crest of the chain, is overlaid by bituminous shales, which, in the foot-hills, are very much broken and contorted. Upon the bituminous shales, resting horizontally and unconformably, are pliocene and post pliocene deposits. The bituminous shales are the source of considerable quantities of bituminous material—asphaltum and oil occurring at many different localities, often filling depressions in superficial deposits; the latter is sometimes seen oozing from the shales.

Two minor ranges, lying between the Santa Lucia and Santa Inez chains, are, so far as known, almost wholly made up of tertiary strata of miocene and pliocene age, attaining a great thickness. More recent deposits in the valleys rest horizontally upon the edges of the upturned tertiary. Here also asphaltum and oil are of frequent occurrence.

In the Santa Susana Range, which is, as far as known, composed of sandstones of tertiary age, upon which rests the bituminous slate formation, we have an instance of an enormous fault, which forms the San Fernando valley. The strata dip to the north, towards the valley of the Santa Clara river; the broken edges are presented to the south, rising like an immense wall from the plain. That this fault exists, is proved by the fact that the upper members of the same series of tertiary strata sink beneath the plain from the northern slope of the Santa Monica Range, further south. The latter terminates in a bold headland on the Pacific ; it stretches east from Point Duma a distance of about forty miles. In this chain is shown a regular anticlinial axis—a central core of granite, with strata dipping away from it on both sides; these, consisting of sandstone and bituminous slates of miocene age, are much altered, more particularly so, however, when they are in contact with the central mass of granite.

The present geographical and geological knowledge of the southern part of the State is extremely limited. The San Gabriel Range is a mass of high and rugged mountains extending from the Cajon Pass, on the east, to the Santa Susana and Santa Monica Ranges on the west. They are largely composed of granitic and metamorphic rocks. North of Los Angeles two high points of granite rise to about 5,000 feet. At the base of the mountains tertiary sandstones have been exposed by erosion; above them are masses of post tertiary detritus piled up against the flanks of the range to heights of over 1,000 feet. The rocks occurring in the San Gabriel Cañon are highly metamorphic, and probably belong to the cretaceous period.

East of the San Gabriel Cañon, on the southern flank of the range, are immense masses of tertiary sandstone, highly disturbed, and traversed by numerous dykes of granite. Both copper and silver ores have been found in this range. Gold has been mined to some extent—though with no great profit.

To the south are the Santa Ana and Temescal Ranges. The latter has attracted considerable attention, on account of the discovery of tin ore about three miles north of the Temescal ranch-house. It is peculiar in appearance, and is probably a mixture of cassiterite (oxide of tin) and more or less earthy and mineral matter. Explorations have as yet failed to develop deposits of any material value. The geological age of the rocks in which it occurs is not known.

As before stated, a perfect topographical union of the Coast Ranges and the Sierra Nevada takes place at the southern end of the Tulare valley. The lowest pass from the Tulare valley to the Great Basin, though there is no well marked one, is that taken by following up the north fork of the Tejon creek and crossing a low ridge into the Tahatchaypah valley. In this route the highest point attained is about 4,000 feet.

The San Emidio Cañon, about twenty miles west of the Cañada de las Uvas, opens into the valley of Kern and Buenavista lakes. Toward the head of this cañon, granite, mica-slate, syenite, hornblende slate, and limestone are found. An inconsiderable thickness of cretaceous strata, overlaid conformably by an enormous development of unaltered tertiary, rests on these. The strata dip to the north at an angle of about seventy degrees. The belt of tertiary extends east along the flanks of the mountains, and terminates in a range of hills northwest of the Cañada de las Uvas. At this cañada cretaceous strata also occur; they are better shown, however, in the Cañada de los Alisos, opening into the plain about five miles further east. At this place the cretaceous belt is of greater width, and the strata are well exposed, though much broken. Above them, along the margin of the plain, are beds of lava, increasing in width and having a northern dip, extending from the mouth of the Cañada de las Uvas to the east and south a considerable distance. These seem to form a wall of division between the Sierra and the Coast Ranges. A range of undisturbed tertiary hills stretches to the northeast along the base of the Sierra Nevada from the Tejon Reservation—at the mouth of the Tejon Cañon. To the southwest, this range extends towards, but does not connect with, the hills east of the San Emidio Cañon, in which the strata dip at such a high angle.

In the preceding outline of the geology of the Coast Ranges, it will be seen that they have all been elevated since the deposition of the cretaceous. No older formation is known to occur throughout their entire length. In them every variety of structure is shown. The chains have been thrown up by forces acting in different directions, which have determined the trend of the mountain ranges, and of the coast. The most powerful seem to have been in a northwest and southeast direction.

It is only along the coast that thick forests occur ; most of the hills and many of the valleys have scattered trees. The fertility of some of the valleys is marvellous ; the bordering hills afford abundant pasturage.

Of the mineral wealth of the Coast Ranges, there is but little more to be said. Although gold, and ores of silver, copper and lead occur at various points throughout their extent, there is but little probability of their ever being found in quantity or under conditions to make them commercially valuable. Quicksilver is the great metallic product of the Coast Ranges, though its ore (cinnabar) occurs in rocks of almost every age. It is found in the Sierra Nevada, (Mariposa county); in triassic rocks in the southern portion of the State; on the eastern slope of the Sierra—in strata of the same age, probably—and in the tertiary. Between Clear Lake, on the north, and the New Idria Mine, on the south, it is found at numerous localities—and it is in the metamorphic cretaceous alone, that large and valuable deposits seem likely to occur.

Of the non-metallic products, coal, borax and sulphur are the most important in an economic point of view. Although the former is known to exist at many different localities it is unlikely that any beds equalling in value those of Monte Diablo will be opened.

The deposits of chromic iron and manganese may hereafter prove valuable. Asphaltum exists in immense quantities, and petroleum has been obtained to some extent by tunnelling. The disturbed condition of the tertiary strata in which it occurs, is not favorable for its accumulation in interior cavities or reservoirs, and, up to the present time, the numerous attempts to obtain it by boring have not met with marked success.

## GEOLOGY OF THE SIERRA NEVADA.

This grand mountain chain, bordering the eastern side of the great central valley of California, claims especial attention, not only on account of its magnitude and geological structure and the unsurpassed grandeur of its scenery, but because of the auriferous belt stretching along its entire western slope and constituting beyond a doubt the richest and most extensive gold field in the known world.

To the consideration of the structure of this chain, and of the great auriferous belt, speaking incidentally of some of the more important mines and mining districts, the remainder of this chapter is chiefly devoted.

The Sierra Nevada properly includes the San Bernardino mountains on the south, and stretches thence into southern Oregon on the north. It is a continuous and lofty chain, marked by a line of dominant peaks, many of which are over 14,000 feet high. It has an average width of ninety miles, being in places much wider. As has been stated, its western slope is more gradual than that of the eastern, which is often very bold and abrupt. On the west it is flanked by a long line of comparatively low foothills bordering the Sacramento and San Joaquin valleys. The "divide" or water-shed is generally on a line passing east of the line of culminating peaks mentioned in the remarks introductory to this chapter.

### GEOLOGICAL STRUCTURE OF THE SIERRA.

This range of mountains is known to consist of a central core of granite, flanked by metamorphic slates. In the southern portion granite is especially predominant, the highest summits and broadest mass of the chain being composed of that rock. The summits of the central portion are of metamorphic slates belonging to the eastern flank, and the culminating points in the northern part of the chain are of volcanic rocks. The western flank at an elevation of not over 1,200 feet, towards the south, and 1,000 towards the north, is marked at intervals, for a distance of over four hundred miles along the borders of the Sacramento and San Joaquin valleys, by the occurrence of undisturbed marine tertiary and cretaceous strata. These, though formerly continuous, are more extensively denuded and washed away in the central portion, than towards either end of the valley, where they are unbroken for long distances. South of the parallel of Sacramento the tertiary strata, containing generally imperfect fossils, are extensively developed; further north, cretaceous, with superimposed tertiary strata capped with volcanic outflows, are found resting horizontally upon the edges of the upturned auriferous slates. In the undisturbed position of these strata, as opposed to the extensive disturbances shown to have taken place in strata of the same age on the western side of the valley, we have the basis of Prof. Whitney's distinction between the Sierra Nevada and Coast Ranges; the State Geologist, considering all those chains or ridges of mountains as belonging to the Coast Ranges, which have been uplifted since the deposition of the cretaceous formation, while those, which were elevated before the epoch of the cretaceous, are reckoned as belonging to the Sierra Nevada.

The tertiary beds which occur at a level of not over twelve hundred feet, and which are never worked for gold, are not to be confounded with the detrital deposits found high up on the flanks of the Sierra, which are of fresh water origin and form the great auriferous gravel beds of California. Soft tertiary sandstones are found all the way from White to Kern rivers, forming rounded hills from two to six hundred feet in elevation. From White river to King's river they are wanting, but from King's river as far north as the Stanislaus these hills recur, rising from one hundred to one hundred and fifty feet above the plain.

Cretaceous strata occur near Folsom, and at many points further north, being abundantly supplied with well preserved fossils. Between Feather and Pitt rivers, in the northern portion of the Sacramento valley, is an extensive belt of cretaceous strata. Vast outflows of volcanic materials prevent, however, the underlying strata from being seen, except where the streams have cut them and exposed the sedimentary deposits beneath. In the cretaceous strata between Cow and Clover creeks a workable bed of coal is reported to exist. It will, however, undoubtedly prove of but little economical value.

The region south of Cow creek is marked by the extensive deposit of volcanic materials. Lassen's Peak, and a large number of smaller extinct volcanoes between it and the Sacramento river, have been the sources of volcanic ashes, scoriæ, and basaltic lava, which cover an area of seventy-five hundred square miles, lying between Pitt river and Oroville. The lava seems to have flown in sheets over the surface, and, between Fort Reading and Red Bluff, extends with a gentle slope westward to the Sacramento river. That the streams have in places cut entirely through the volcanic cappings, and into the cretaceous strata beneath, is indicated by the occurrence of fossils of that age in boulders found in the cañons and gulches.

Near Oroville, at Pence's ranch, the relation of the newer formations to the auriferous slates is finely displayed. The cretaceous strata, with a low dip to the southwest, rest upon the edges of the upturned auriferous slates ; upon the former lie tertiary strata, probably unconformably, though the disturbances have been slight, and these in turn are covered with tables of basaltic lava resting conformably upon them.

### THE GREAT AURIFEROUS BELT.

Although auriferous rocks are not confined to the western slope of the Sierra Nevada, yet it is from the deposits and veins there found that almost the entire gold product of the State has been derived. The belt may be said to extend from Fort Tejon, northeast along this slope of the Sierra, into Oregon. The gold bearing belt of metamorphic slates within those limits varies greatly in width and richness. Towards its southern portion it is but feebly represented, but it widens out as it extends north. In the northern portion of the State it is almost entirely covered with vast deposits of volcanic materials, and in many places rendered inaccessible to the miner. It is the central portion of this belt that forms the great gold mining region of the State—embraced in the western portions of Mariposa, Tuolumne, Calaveras, Amador, El Dorado, Placer, Nevada, Sierra, and Plumas, and the eastern part of Yuba and Butte counties.

In the northwestern part of the State the auriferous slates are also exposed, but granitic rocks are there more extensively developed than in the central portion of the gold field, and the conditions for the formation of rich and extensive deposits have not been as favorable as elsewhere ; hence, in speaking of the main gold field, that portion of the State may be considered as of comparatively little importance.

### SOUTHERN PORTION OF THE GOLD FIELD.

Between Mariposa county and Fort Tejon the granitic rocks of the Sierra descend lower down upon its flanks than further north, and the slates do not occupy a continuous belt, but occur in patches in the granite—although gold is found throughout the entire distance, and some rich placers have been worked at intermediate points, the veins of this portion must be considered as of inferior importance to those which are found in the broad and continuous belt of metamorphic slates extending to the northwest. Placer mines are worked to a limited extent in the Tehatchaypah valley, and in Walker's Basin. Near Kern river, are some promising quartz veins in granite, some of which have been worked with large profit. Arsenical pyrites occurs abundantly in these veins in the lower workings, causing trouble in milling the ores.

### MARIPOSA COUNTY.

It was on the Mariposa estate, in this county, that some of the earlier quartz mining operations in California were undertaken. The western portion of the county is the more important, as being that traversed by the auriferous slate belt, in which are situated well known and extensively worked quartz mines. The eastern part is remarkable for the bold grandeur of its scenery, and contains several of the more lofty peaks of the Sierra. In this county is also located the famous Yosemite valley, elsewhere in this volume so fully described, that only a few considerations as to the cause of its origin will here be introduced. The volcanic accumulations being less extensive in this than along the gold belt in the more northern counties, no extensive hydraulic washings are carried on here—in fact, the yield of the placer mines in this county has been so much diminished that they may now be considered unimportant.

*The Fremont Grant*, now better known as the Mariposa estate, having from the first figured largely in the history of this county, still constitutes one of its prominent features. This estate embraces an area of about seventy square miles, extending from the Merced river, southeast, a distance of sixteen miles. It is traversed by a belt of metamorphic slates, with belts of generally highly metamorphosed sandstone on either side. Beyond the sandstone are slates again; serpentine and limestone occur in patches. Towards the southern end the metamorphism seems to have been greater, and granite cuts across the slate belt and continues westward towards the foot-hills. This belt is marked by the occurrence of numerous quartz veins which generally strike in a direction parallel to the trend of the inclosing strata, and dip with them. Veins in the granite to the south have the same general trend, a few degrees west of north.

There are several groups of mines within the limits of the estate. The Pine Tree and Josephine are located a mile and a half from the Merced river, and within a short distance of each other. They are generally considered to be on the same vein, though never having been connected, it is uncertain. They are remarkable for their enormous width of veinstone, which varies from twelve to forty feet, and in the latter averages twenty feet.

Six miles southeast of the Pine Tree and Josephine is another group of mines, of which the Princeton is the most important. This has in former years proved one of the most productive quartz veins of California. The trend and dip of the vein are the same as those of the inclosing strata. It varies in width, from a few inches to eight feet.

Its course is marked by many flexures. The inclosing rock is a dark colored, fine grained, argillaceous shale. The mine has furnished specimens of crystalline gold, having brilliant faces of rare and unequalled beauty. Iron pyrites, blende and galena occur in greater quantities here than at the Pine Tree and Josephine mines.

*Mines Elsewhere in the County.*—Heavy outcrops of quartz occur near Coulterville. A few miles northwest of the town is a massive outcrop known as the Peñon Blanco (white rock). Here the quartz mine, known as McAlpine's lode, has been extensively, and, it is said, profitably worked. The outcrop is generally considered to be a continuation of those which mark the position of the Pine Tree and Josephine veins. Outcrops of quartz occur along a northwest and southeast line, for a distance of seventy miles from the mines on the Mariposa estate, extending as far north as Jackson, in Amador county.

It is equally certain that the principal quartz veins and the most extensive placer mines in the counties of Mariposa, Tuolumne, Calaveras, and Amador, are nearly in the line of this succession of outcrops. An interesting quartz vein a few inches thick, containing crystalline cinnabar, occurs in the metamorphic slates, on the Merced river, near Horseshoe Bend.

### TUOLUMNE COUNTY.

The eastern portion of this county lies in the high regions of the Sierra, and is underlaid by granite. In the western part of the county the auriferous slate belt attains a width of about twenty-five miles. The metamorphic rocks are marked by very different lithological characters—the slates are silicious and argillaceous, rather than talcose. Sandstones are so highly metamorphosed as to have a trappean character, making it often difficult to distinguish between eruptive and metamorphic rocks.

Limestone occurs at various localities in Tuolumne county. It is generally crystalline, of a bluish gray color, though where most highly altered it is white. It is quarried extensively near Columbia, and affords a good material for building purposes, monuments, etc. The mining region in this county is very extensive, and contains not only numerous quartz mines, but large areas of deep deposits of auriferous gravel, covered by sheets of basaltic lava, which have flown down the western slopes of the Sierra, filling and closing the channels of former rivers, directing their courses, and remodeling the topography of the entire region. The detrital deposits of this county have furnished more fossil remains of large animals than the same formations in any other part of the State.

*Table Mountain.*—In this county is, perhaps, the most striking example of the flat, table-like masses of basaltic lava capping the auriferous detrital deposits, and brought out into bold relief by the erosion of the softer materials on both sides of them. The well known Table mountain of Tuolumne county is a vast lava flow from the lofty volcanic region beyond the Big Trees of Calaveras. It forms a nearly unbroken ridge on the north side of the Stanislaus, two thousand feet or more above the river. Its upper surface is nearly level, but the edges and the surrounding country have been denuded to an enormous depth by forces which its superior hardness enabled it to resist. The Stanislaus river now runs at a depth of two thousand feet below, and could not have existed at the time of the volcanic outflow, which must have sought the lowest channels. That this was the case, and that where the Stanislaus now runs there was a mass of mountains, is not a mere matter of speculation, for this lava flow is seen to have crossed the present valley of the Stanislaus at Abbey's Ferry, and must have followed the course of an ancient channel. It follows, that since the ancient valley was thus filled with the volcanic mass, that an amount of denudation, not less than three or four thousand feet, has taken place within the most recent geological epoch.

This is one of the many examples supplied along this belt of the results of extensive lava outflows from the higher portions of the Sierra. They are not confined to this county, being a marked feature in the mining counties north of Tuolumne, particularly Nevada and Sierra. This whole region has been remodeled, and where are now deep cañons and gorges there were formerly hills, which determined the course of the streams of molten lava. We thus have, on the western flank of the Sierra, an ancient as well as a present river system. If further evidence of this fact were wanting, it is furnished in the character of the detrital deposits, and the surfaces of the rocks, in the ancient channels, which, lying beneath the lava, and the accumulations of volcanic material, have been largely developed in the system of tunnel mining now extensively prosecuted in all the leading mining districts of the State.

*Fossil Remains.*—As before stated, these ancient deposits are of tertiary age—they have been referred to the pliocene epoch. Since the time of their deposition, and the period of that intense activity that followed, enormous denudation has taken place and continued to the present time, resulting in the formation of new and shallower deposits from the disintegration of the old. In this superficial detritus the works of man are found so closely associated with the bones of the mastodon and elephant, that the conviction necessarily follows that he existed previous to the disappearance of these animals from a region in which they were no doubt numerous. These, as well as discoveries of like nature made in Europe, prove the human race to be of much greater antiquity than is generally supposed. The remains of the mastodon and elephant have not been found in the deposits beneath the lava, but the bones and teeth of animals, and pieces of silicified wood, are common in these older auriferous gravels; impressions of leaves in the clay beneath the gravel are also found. Of the animals peculiar to the deposits beneath the lava there are the rhinoceros, an extinct species of horse, and also a species allied to the camel.

Six miles east of Sonora, in the neighborhood of Soulsbyville, are other volcanic deposits originating in the high Sierra. Near Soulsbyville, lava, fifty feet in thickness, rests upon a stratum of volcanic ash and pumice stone, deposited in a stratified form. These deposits contain the bones and teeth of animals similar to those found beneath the lava of Table Mountain.

*Gold Mining.*—Nearly the whole region between Kincaid Flat and as far north as the Stanislaus river has been worked, proving one of the most productive placer mining districts in the State. The surface of the limestone, with its deep crevices, has acted favorably in the retention of the gold.

Many quartz veins have been and are still being extensively and profitably developed in Tuolumne county; several of those heretofore worked having yielded very large returns. At the present time the business is being prosecuted in a number of districts with satisfactory results. The great "mother vein," so termed, appears in an outcrop near Jamestown, forming the eminences known as Whisky Hill, Poverty Hill, and Quartz Hill. It is of very large, though of variable dimensions, and, while barren in many places, has paid at least moderately well in others, the above localities having been the scenes of extended and tolerably successful mining and milling operations.

### CALAVERAS COUNTY.

The belt of auriferous metamorphic rocks continues on through the central portion of Calaveras county, its width remaining about the same as in Tuolumne. The southwestern portion of the former is rarely covered except by superficial detritus; but the northeastern, in the neighborhood of the junction of the slates and the granite, is marked by the occurrence of gravel deposits, covered by volcanic outflows, similar to those in Tuolumne county.

*Union Copper Mine.*—The western portion of the belt includes the celebrated Union Copper Mine, a few years since largely and profitably worked, though but little has been done upon it for the past two years, owing to the low price of copper ore, and to lawsuits pending against the present owners. The ore is not found in a regular fissure vein, but lies apparently in independent lenticular masses. Large shipments were made from this mine for several years after it was first opened. The ore is the yellow sulphuret, (chalcopyrite), with a mixture of iron pyrites. The inclosing rocks of this deposit are chiefly chlorite and chloritic slates. Serpentine, presenting indications of copper, occur west of Copperopolis, apparently trending with the formation.

*Gold Mining.*—The great quartz vein of California passes to the east of these copper deposits. It appears at Carson Hill, at Albany Hill, at Angels, and both south and north of San Andreas. It has been extensively worked at various points, the mines of Carson Hill alone having furnished four million dollars of gold. From the Morgan claim over two million dollars are said to have been taken from a small space. The slates adjoining the vein have proved very rich, paying as much as eighty dollars to the ton. The placers in this vicinity were also formerly very prolific. The gold, however, is here so irregularly distributed in the quartz veins as to have rendered the business of mining for it very fluctuating and hazardous. The Stanislaus mine, near Santa Cruz Hill, in the vicinity of Robinson's Ferry, has furnished remarkable specimens of auriferous rock, in which, associated with the gold, are the rare tellurides of silver and gold, in larger quantity than they have been found elsewhere in the State.

The placer and hydraulic mines of Calaveras county are extensive, and have generally proved fairly and often highly remunerative. Volcanic deposits are widely diffused over the northeastern section of the county. Limestone, deeply eroded on the surface, occurs towards the eastern portion of the gold bearing belt.

An exposure on the road from the Stanislaus river to Murphy's shows a thickness of five hundred feet of volcanic and sedimentary material resting on the limestone. The upper portion, over one hundred feet in thickness, is basaltic lava, resting upon a series of beds of sand, clay and volcanic ashes containing boulders of quartz. The surface of this limestone, in the vicinity of Murphy's, has been considerably worked for placer gold; imbedded in it are veins of quartz, some of which have also been mined. A vein occurring in it contains not only gold, but cinnabar in small quantity, together with vitreous copper, and some blue and green carbonate of copper. A second instance of the occurrence of cinnabar in the rocks of the Sierra.

### AMADOR COUNTY.

The main gold bearing belt passes through the central portion of Amador county, but is much narrower here than in Calaveras, being only about twelve miles wide. Towards the eastern border of the slates we have a continuation of the limestone of Tuolumne and Calaveras. In placer mining, once active here, but little is now being done. Along the line of the main belt there are a number of prominent mines, foremost amongst which is the Hayward or Amador claim, consisting of the Eureka and Badger lodes. The cost of stamping and milling quartz at one of the mills of this company, where water is plenty, is stated to be sixty-six cents per ton; less, perhaps, than at any other mill in the State.

At Volcano we have the same limestone formation, with small veins of quartz imbedded in it. Here, also, the detrital mass is thick, and has been profitably washed in many places. In one of the beds in this vicinity, a distinctly marked quartz vein occurs in the gravel, showing how recently veins have been formed.

On the Cosumnes and Mokelumne rivers fine sections of the sedimentary, with superimposed lava deposits, are exhibited.

In the tertiary foot-hills bordering the Sacramento valley, coal has been found, but too limited in quantity and of too poor a quality to be of any other than mere local value.

### EL DORADO COUNTY.

The geological features of this county are similar to those of Amador, but the volcanic formations are not so extensively developed as in the latter. There are some detrital deposits here still worked by the process of hydraulic washing. The belt of auriferous rocks occupies a great breadth here, it being nearly thirty miles broad, in a direction at right angles to the trend of the slates, which largely predominate. Some portions of these are of triassic age, a determination based, in part, upon the resemblance of the impressions found in the slates to the fossils from known triassic rocks occuring at Washoe, and in the Humboldt mining region, in the State of Nevada. Quite a number of fossils of unquestionably triassic age have been found by members of the State Geological Survey, in Plumas county, farther north.

### PLACER COUNTY.

The volcanic deposits occupy a large area in the lower part of this county, rendering the working of quartz subordinate to hydraulic and tunnel mining.

The metamorphic belt is in great part covered by volcanic materials. From near Auburn to the Sacramento plain, granite is the underlying rock. In this several quarries have been opened, furnishing a superior building material. Iron ore (hematite) occurs in considerable quantity a few miles from Auburn, and under as favorable conditions, as regards extent and location, as at any other point in the auriferous slate series. The north and Middle Forks of the American river flow through deep gorges or narrow cañons, which they have eroded in the volcanic outflows, cutting deep below them into the slates, of which they afford fine exposures.

The towns of Iowa Hill, Wisconsin Hill, and Todd's Valley, mark an important line of hydraulic mines, extending across this county. In places the detrital beds have a thickness of more than five hundred feet, the "cement," or coarse compacted gravel below, often being one hundred feet in depth. On the Middle Fork of the American, the detrital beds reach to the summits bordering the cañon ; at Sarahsville, near which place is an immense mass of serpentine, they recede towards the north. These deposits are covered by beds of sedimentary volcanic materials capped by basaltic lava, which forms the summit of the ridge between the North and Middle Forks of the American river. This ridge is cut by deep cañons or gorges, in one instance two thousand feet in depth, with sides sloping at as high an angle as forty-five degrees. The auriferous slates beneath are sometimes eroded to a depth of fifteen hundred feet, and peculiar facilities are thus afforded for the study of their structure.

It was in this vicinity that Prof. Whitney observed the very interesting fact, illustrative of the probable fan-like structure of the strata flanking the central portion of the Sierra. These usually show an easterly dip, towards the chain ; in these deep vertical sections, it was noticed that the upper one thousand or twelve hundred feet had the normal dip to the east, but below this there was a gradual curve, and at the bottom the dip was to the west, as if the upper portion of the strata had been forced back by immense pressure from above—a variety of structure, of which there are many examples in the Alps, and which, for a long time, perplexed European geologists.

### NEVADA COUNTY.

The auriferous belt in this county is wide, and includes extended areas of granite, one of which passes but a little to the east of Grass Valley. The limestone belt may also be traced through the southwestern part of the county. It is exposed at a place called Lime-kiln, ten miles south of Grass Valley, and is in line with the fossiliferous limestone at Pence's ranch, known to be of carboniferous age.

As we proceed northward on the auriferous belt, the strike of the strata becomes more nearly north and south, the system of northwest and southeast trends gives out, and we find a preparation for the north and south lines of upheaval, which characterize the mountain chains of western Nevada and northeastern California. The rocks retain, however, the same marked easterly dip, and toward the lower side of the belt the inclination seems to be greater than it is further east.

Grass Valley is justly celebrated as being the principal quartz mining center of California, the business having been commenced here at an early day, since which it has been prosecuted with many vicissitudes, but generally with marked success. The veins here, though numerous, are not generally large; their richness, however, compensates for their want of size. Their average width is perhaps two feet, while some, that have proved extremely productive, have not averaged above a foot or eighteen inches. They are for the most part highly mineralized, and have evidently been formed by aqueous action. They abound in the sulphurets of iron, copper and lead, and occasionally zinc; arsenical pyrites also sometimes occur, as for instance in the Norambagua mine, and on Heuston Hill. The gold is generally associated with the sulphurets, though it is found sometimes in beautifully crystalline masses in pure quartz; it is irregularly distributed throughout the veinstone, which is often barren, but frequently very rich. The rocks in the vicinity of Grass Valley are so highly metamorphosed as to obliterate all traces of stratification; and it is, therefore, impossible to state the true position of the veins with reference to them. The most productive vein has been that upon Massachusetts and Gold hills. In working seventy thousand tons of rock from this mine, the average yield of gold was over eighty dollars per ton. The sulphurets occurring in the Grass Valley mining district are generally rich in gold. In quantity they usually do not exceed more than one or two per cent. of the mass of ore; though in some mines they are more abundant. They are now carefully collected and worked by Plattner's chlorination process, by which over ninety per cent. of their entire contents in gold is saved. The experience gained at this place, as well as in working other quartz lodes elsewhere in California, some of which have been developed to great depths, tends to disprove the theory that the yield of gold diminishes in the ratio of the depth attained.

Prof. B. Silliman, in speaking of the Eureka mine, near Grass Valley, observes that from the date of its location, February 7th, 1851, to the close of 1858, it proved only a source of expense; and its history is instructive, as suggesting that shallow surface explorations, in gold mining may be as unsatisfactory as they are known to be in other mining enterprises. So late as 1858 five thousand tons of quartz, taken above the drain level, or thirty feet from the surface, yielded in the mill less than ten dollars per ton gold—not returning expenses. A shaft sunk to a depth of about fifty feet afforded quartz, however, which yielded fifteen dollars per ton, and the amount of gold rapidly increased to twenty-eight dollars per ton at one hundred feet. Between the one hundred and the two hundred feet levels the average yield was about thirty-seven dollars per ton, and between the two hundred and three hundred feet levels the average has been about fifty dollars per ton, rising to sixty-four dollars in the last months of 1866.

There are in fact two distinct veins in the Eureka mine, separated from each other by a mass of greenstone, or metamorphic sandstone, about twenty-eight or thirty feet in thickness. The smaller of theso veins is on the south, and has not been explored, but is well defined at a point where the shaft and cross cuts have exposed it. The greenstone forms the hanging wall of the main vein, and is particularly regular and smooth, in some places beautifully polished. The foot wall consists in some parts of soft serpentine. It may be interesting to analyze a little more in detail the returns of this mine, as illustrating a point already alluded to, viz: its progressive increase of gold with increase of depth. From October, 1865, to December 31, 1865, the quantity of quartz crushed was twenty-four hundred and forty-five tons, yielding an average of thirty-three dollars and eighty-seven cents per ton, and costing to mine and reduce thirteen dollars and fifty-one cents. From January 1st to June 1st, 1866, the crushing was forty-seven hundred and three tons, averaging forty-six dollars and sixty-eight cents per ton, at a cost of twelve dollars and fifty-two cents per ton. From June 1st to September 30th, 1866, the amount of quartz crushed was forty-two hundred and twenty-seven and three-fourths tons, giving an average yield of sixty dollars and thirty-three cents per ton, at a cost of fifteen dollars and seventy-eight cents per ton. For the whole year ending September 30th, 1866, the total crushing was eleven thousand three hundred and seventy-five and three-fourths tons, yielding a general average per ton of forty-five dollars and eighty-three cents, at a mean cost per ton of thirteen dollars and seventy-five cents. The total product of bullion from this mine for the year ending September 30th, 1867, was $585,000—average yield of the ore having been $48 per ton.

Nevada city is another important quartz mining locality in this county. Nevada county also claims special attention, on account of some of the most extensive hydraulic washings to be found in the State. The great ancient river channel of Sierra county, known throughout California as the Blue Lead, enters this county on the north, at Snow Point, and probably continues across it, connecting with the detrital deposits at Red Dog, and thence through Placer county to Todd's Valley. Though it is impossible to reconstruct the ancient river system in the absence of more full and perfect data, enough is known to establish the fact that their course was approximately at right angles to that of the present streams.

In the hydraulic washings at Red Dog, great numbers of trunks of trees have been uncovered in the operations of mining; they are silicified, and are shown to have been subjected to the force of violent currents before they were covered by the thick detrital deposits. In the finer sedimentary layers, impressions of leaves are found, but animal remains occur less frequently than in similar deposits in the more southern counties. Auriferous gravel deposits, beneath volcanic formations, have been worked in the vicinity of both Nevada City and Grass Valley. At the former place, above the lower twenty feet constituting the pay gravel, is a bed of lignite, with much iron pyrites resulting from the reducing action of decaying vegetable matter.

Between French Corral and San Juan, along the Middle Yuba river, is a belt of hydraulic washings famous for their productiveness; this is about one thousand feet wide, and towards its eastern end the bottom of the deposits is at an elevation of at least one thousand feet above the river, which has cut its channel since their deposition. The lower portion of these detrital deposits, which consist of pebbles and boulders of quartz, granite, and the metamorphic rocks of the Sierra, firmly compacted and cemented together, is often of a bluish color, contrasting with the brownish yellow of the upper portion, due to oxidation of iron. This deposit appears to be the continuation of a known ancient river channel, traversing the entire western portion of Sierra county, and running parallel with the famous Blue Lead already mentioned.

### SIERRA COUNTY.

This county lies wholly in the high portions of the Sierra north of Nevada county. The lowest point in it, where the north Yuba river cuts its western boundary, is over two thousand feet above the sea. The auriferous slates are exposed in its western portion, though they are generally covered by accumulations of volcanic origin, consisting largely of breccia, or volcanic conglomerate. Some of the summits, formed by basaltic lava capping the slates, are estimated to be over eight thousand feet in height, and in this county form the crest of the Sierra Nevada mountains. The slates exposed in the numerous deep cañons, with which the county is furrowed, are seen to inclose large masses of serpentine and talcose slate; they also include many promising quartz veins.

Within five hundred feet of the summit of the Downieville Buttes, or, as they are sometimes called, the Sierra Buttes, at an elevation of eight thousand feet, are the quartz mines belonging to the Sierra Buttes and Independence Mining companies. Here, an immense vein, from six to thirty feet in width, cuts across the ravines and gulches from east to west, dipping at an angle of forty-two degrees to the north, a more detailed description of which is given in the chapter on the subject of "Mines and Mining," to be found in another part of this volume.

Sierra county, as before remarked, is almost wholly covered by beds of volcanic origin, cut in numerous places by the streams which have eroded their channels to an immense depth in the underlying slates. The auriferous gravel deposits of this county are probably more extensive than are to be found elsewhere in the State. The famous Blue Lead, or ancient river channel, has been traced from Sebastopol, in the northern part of the county, south, crossing the course of the present streams nearly at right angles, to Snow Point, in Nevada county, its course being marked by a long line of tunnel claims and mining camps.

The phenomena exhibited here do not differ materially from those presented in Table Mountain, Toulumne county. A map of Sierra county, prepared by Messrs. Crossman & Cochran, the former of whom has had peculiar advantages in the study of the ancient river system of this county, represents four of the ancient river channels as having a generally northerly and southerly course, and crossed by the present streams, instead of running parallel to them, as is the case in Tuolumne county. The valley of Table Mountain river is shown to have been filled with one volcanic outflow or stream, but in Sierra county there are evidences of a series of numerous and complicated volcanic phenomena.

The deposits in this county, though they have been extensively worked, may be considered as almost intact, when the probable amount of gold they will yet furnish is contemplated. It is probable that the volcanic formations predominate east of the Sierra in this county—the valleys most likely containing extensive fresh water tertiary deposits. Coal has often been reported, but is probably nothing more than lignite, in limited quality, such as occurs at many points east of the Sierra.

### PLUMAS COUNTY.

The auriferous slates are grandly exposed in the central portions of this county. The volcanic outflows from Lassen's Peak on the north, and Pilot Peak on the south, and the volcanic crest of the Sierra, cover the larger portion of it. The upper part of Genesee valley is marked by the occurrence of granitic rocks, the lower by metamorphic slates. In a metamorphic sandstone, exposed in a cañon connecting Indian and Genesee valleys, Messrs. Brewer and King, of the geological survey, found fossils which were considered by Mr. Meek, the distinguished paleontologist, as almost certainly of jurassic age. The locality is about four miles below Gifford's ranch, and near what is called Mormon Station. Adjacent to this locality, a belt of highly crystalline limestone, containing a few obscure fossils, occurs at the junction of the metamorphic rocks and the granite; it is probably of carboniferous age. Triassic fossils were also found at another place in the calcareous slates, between the limestone belt and the granite.

The discovery of triassic and jurassic fossils in the rocks of Genesee valley, and the subsequent discovery of belemnites in the slates, on the Mariposa estate, indicating a formation later than the trias, and their stratigraphical position, led to the announcement in the *Journal of Science*, September, 1864, by Prof. Whitney, of the fact, that a large portion of the auriferous rocks of California consist of metamorphic triassic and jurassic strata.

This was followed by an independent announcement by Mr. W. P. Blake to the California Academy of Sciences, in October of the same year, of the probable jurassic or cretaceous age of the gold bearing slates of California, founded upon the indentification of a group of secondary fossils from the slates contiguous to the Pine Tree vein on the Mariposa estate.

Previously, the occurrence of gold was considered as a marked indication of silurian or palæozoic rocks, though the earliest labors of the survey tended to the conclusion that such was not the case.

Since the discoveries made in Mariposa county, the belt of jurassic rocks has been traced as far north as the Stanislaus river, fossils having been found at several intermediate points ; and enough is now known to establish the fact, that the great metamorphic belt flanking the Sierra, is made up of triassic and jurassic strata, with a comparatively small development of carboniferous limestone ; and that the occurrence of gold *in paying quantities* in California seems to be confined to strata of these ages.

Lassen's Peak, at the extreme northwest corner of Plumas county, consists of an imperfect flattened cone of volcanic ashes and débris, through which project sharp ridges of trachyte, rising to a height of two thousand feet from a gently sloping plateau of gray lava. No crater remains on the summit, but they are to be seen on the tops of numerous smaller cones rising from the volcanic tables in the vicinity. Traces of glacial action are to be found on all sides of this peak, between points six and nine thousand feet in elevation. Glaciers have covered its slopes and descended towards the head-waters of the streams, the cañons of which now afford such stupendous examples of denudation, they being in places more than three thousand feet deep.

The northeastern portion of the State, as already remarked, is largely covered by lava — one almost continuous area of nearly ten thousand square miles being thus overlaid.

Mt. Shasta is an enormous volcanic mass, and forms one of the grandest objects of California scenery. It is a symmetrical cone with steep slopes, and sharp summit, rising to an altitude of 14,442 feet. The upper six thousand feet are covered with perpetual snow. It was for a time supposed that this was the highest summit in California, but the explorations of the State Geological Survey, in the regions of the high Sierra, between the parallels of 35° and 39° have demonstrated the fact that there are other peaks yet higher.

In the northern counties the auriferous rocks are similar in their lithological characters to those of the metamorphic belt passing through the principal mining counties already described. No fossils have been found within the State north of 41°. The series expands to the westward, and north of the Klamath river, extending quite to the coast.

In the counties north of the great valley placer mines have been worked, and furnished in the aggregate a large amount of gold ; quartz veins have also been developed here to some extent. The country is exceedingly rough, and as yet but thinly settled, much of it not being thoroughly explored. Mountains ranging from six to eight thousand feet in height are not uncommon in this region. The higher summits west of the Sacramento river are granitic, while those to the east are of volcanic origin. To the State Geological Survey we are indebted for full descriptions and accurate measurements of several high peaks situated in the Sierra Nevada range, between 35° and 39°, though the number and great altitude of these summits had been previously noted.

The culminating point, Mount Whitney, near latitude 36° 30′, is about 15,000 feet high, while within a radius of thirty miles are numerous peaks rising 14,000 feet and over. These are all granite, which here forms the mass of the chain, eighty miles or more in width. We have in this portion of the range by far the grandest mountain scenery to be found in the State. Cañons from three to six thousand feet deep are not uncommon in this region. Above an altitude of 4,000 feet evidences of previously existing glaciers on an enormous scale are to be seen, in the frequent occurrence of large areas of polished rocks, and of moraines. Smooth surfaces are especially frequent at heights varying from 6,000 to 11,000 feet. To an elevation of 9,000 feet the slopes are covered with forests of heavy timber. Above that altitude, and to a height of 10,000 or 11,000 feet, the stunted growth of alpine species is found; while below, four thousand feet, we have the scattered forests of oak and pine, and the dry foot-hills that border the great San Joaquin valley.

The Yosemite valley lies in the granitic part of the chain. Ice and water have, no doubt, been the chief agents in the formation of this wonderfully grand and singular gorge ; though it is highly probable that other causes may have operated with these to impress upon it its peculiar configuration.

The high peaks near Mono Lake are of metamorphic slates belonging to the eastern flank, and are marked by more rounded outlines than the granite summits further south. Mount Dana and Castle Peak are each about 13,000 feet in elevation—the summit of the former being readily accessible.

The water from the eastern slope of the Sierra Nevada, north of 35°, as far as the Oregon line, flows into closed valleys, or basins without outlets to the sea. East of the Sierra Nevada, therefore, we have a long line of lakes bordering the chain. Sometimes the water sinks into the sands of the desert. Some of these interior basins or valleys lie at a high elevation, while others—like Death Valley—are known to be below the level of the sea. The water of the lakes is generally intensely saline, and the lakes themselves show evidences of quite recent changes of level. Large areas, now dry, have been formerly occupied by lakes or inland seas, which may have had their greatest developments during the existence of gigantic glaciers, the marks of which are so abundant throughout the high Sierra. But comparatively little is known of the geology of the Great Basin, it being a vast and almost unexplored desert, which is also the case with the southeastern portion of California, covering an area of about thirty thousand square miles.

Geologically, the Sierra Nevada probably includes other mountain chains, lying to the east in the Great Basin, though it is doubtless older than the Rocky Mountain chain. From geological evidence, we know that its upheaval took place before any of the Coast Ranges were formed; or, in other words, after the deposition of the jurassic, and previous to that of the cretaceous era.

# CHAPTER VII.

## ZOOLOGY.

General Plan. Mammalia: Bears—Raccoon—Skunks—Glutton—Fisher—Marten—Weasel—Otter—Cougar—Jaguar—Ocelot—Wild Cats—Wolf—Coyote—Foxes—Sea Lions and Seals—Sea Elephant—Shrews—Bats—Beaver—Marmots—Squirrels—Rats—Gophers—Porcupine—Hares—Elk—Deer—Antelope—Bighorn—Whales and Porpoises. Birds: Paysano—Cuckoo—Woodpeckers—Eagles—Hawks—Owls—Vultures—Crows—Magpies—Jays—Kingfishers—Flycatchers—Nighthawks—Humming Birds—Swallows—Waxwings—Thrushes—Mocking Birds—Grosbeaks—Linnets—Goldfinches—Sparrows—Pigeons—Doves—Cranes—Herons—Ibis—Plover—Snipe—Curlews—Quail—Swans—Geese—Brant—Ducks—Pelicans—Cormorants—Albatross—Fulmars—Petrels—Gulls—Loons—Grebes—Sea Parrot—Sea Pigeon—Murre. Reptiles: Tortoise—Turtles—Lizards—Iguana—Horned Toads—Glass Snake—Rattlesnakes—Harmless Snakes—Frogs, etc.,—Salamanders—Four-legged Fish. Fishes: Perch—Kingfish—Basse—Moonfish—Goldfish—Viviparous Fish—Redfish—Kelpfish—Mackerel—Bonito—Albicore—Barracouta—Flying Fish—Panther Fish—Sticklebacks—Rock-Cod—Sculpin—Wolf-Eel—Gobies—Toad Fish—Lump Fish-Flat Fish—Halibut—Turbot—Sole—Cod—Whiting—Codling—Tom-Cod—Snake Fish—Salmon Trout—White Fish—Smelts—Killies—Herring—Anchovies—Chubs—Suckers—Conger-Eel—Balloon Fish—Sea Horse—Pipe Fish—Sturgeons—Rays—Sharks—Torpedo—Angel Fish—Stingrays—Lampreys—Worm Fish. Mollusca: Oysters—Clams—Date Fish—Mussels. Crustacea: Crabs—Lobster—Shrimps—Crawfish.

### THE ANIMALS OF CALIFORNIA.

The following is a brief systematic enumeration of the vertebrated animals of California, intended to show, as far as the allotted space will permit, how many and what sorts of creatures we have, of the four highest classes. Their scientific names are given, so that those who seek further information may find it in books which treat of them, and in which the English names are often omitted or used differently. The latter are notoriously uncertain, the same being often given to different animals, and different names to the same animal in various regions, some instances of which are here mentioned.

It would be impossible to give here even a list of the invertebrate animals, and as few of them have English names, such a list would convey no information to the general reader. No complete work on the insects has yet been attempted, and the Coleoptera alone have been pretty fully described, numbering about four hundred species. The known Mollusca are nearly eight hundred species, including those of the land, fresh and salt waters. The Radiata are also as yet undetermined, but it is hoped that the Legislature will authorize the publication of complete illustrated works on all these branches, as well as those on the Vertebrates which are now being prepared by the Geological Survey.

### MAMMALIA.

The first in rank of the animal kingdom is the class to which the name of "animals" is often improperly limited, also called "quadrupeds," although there are also numerous four-footed animals in the class of Reptiles. The name of Mammalia, or sucklers, is the only one that really defines the limits of the class, as it includes the whales, which have no legs, and the bats and seals, in which the limbs are scarcely to be called legs.

Of the nine orders usually recognised in this class, three are without native representatives in California, viz: the *Quadrumana*, or monkeys, *Pachydermata*, including the hog, elephant, etc., and the *Edentata*, of which the armadillo and ant-eater are examples. The others are, however, abundantly represented, about one hundred and fifteen species having been found in the State or along its seaboard.

### ORDER CARNIVORA—FLESH-EATERS.

The Grizzly Bear (1. *Ursus horribilis*) stands at the head of the rapacious order, although its little relative, the raccoon, is nearer the monkeys in many respects. "Grizzlies" were formerly numerous in nearly every county of the State, and so many accounts of their ferocious depredations have been published, that every one is sufficiently acquainted with the character of the animal. Now, however, they have become scarce in the more populous counties, the American rifle having destroyed or driven them away, and their audacity is so much diminished, that they are scarcely dangerous unless suddenly surprised in their dens, or wounded. When seen at some distance they usually walk away with a slow and dignified pace, showing that all they want is to be let alone. Their food, like that of their relatives, is in great part vegetable, and they have not, therefore, the bloodthirsty disposition of many of the more carnivorous animals. Though formerly considered untamable, they are now often seen in menageries, and show great sagacity, though too rough to be safely played with. Their skins are of little or no value, and only the appetite of a famishing hunter can relish the flesh of an old one.

The Black Bear *(2. Ursus Americanus)* is limited to the counties north of San Francisco bay, and the higher part of the Sierra Nevada. It is exactly the same animal found in the Atlantic States, and differs from the grizzly not only in color, but in anatomical characters. The hair is also much softer, and the skin of considerable value for robes, etc. It is rather a timid animal, usually nocturnal in its travels, and generally runs away at the first suspicion of being hunted. Occasionally its depredations on young pigs, calves, etc., make it an object of the farmer's vengeance, and its meat is pretty good eating. The skin is worth four to eight dollars. The bears called "cinnamon" and "brown" are believed by naturalists to be merely varieties in color of the grizzly and black species, as litters of young are found varying through almost every shade between these colors, although there is nothing indicating mixture of the two species. There is, however, some reason to think that the brown bear of Mexico, a smaller kind, may be found in our southern counties. It is mentioned in the United States and Mexican Boundary Report as *Ursus amblyceps*, Baird.

The Raccoon of Western America *(3. Procyon Hernandezii)* differs from the Eastern species only in some unimportant anatomical characters. It has the same mischievous, playful disposition, like that of the monkeys, and is often tamed as a pet. It is hunted only for sport, or for its skin, which is little used; but its flesh is considered good eating by many. Being very much an arboreal animal, it is scarce in proportion to the absence of timber, becoming rare in the southern counties. Its depredations on the hen-roost occasionally make it the victim of the farmer and his dogs. The skin is worth only from ten to twenty-five cents.

The American Badger *(4. Taxidea Americana)* takes the place of the raccoon in the woodless districts and the forests, where its burrows may be seen excavating the ground in every direction—being dug in pursuit of squirrels or other small quadrupeds. Being mostly subterranean in its habits, unable to climb or to run fast, it does no injury to the farmer, but on the contrary benefits him by destroying large numbers of vermin. Its hair is coarse, its skin worth only about seventy-five cents to one dollar, and its flesh is almost uneatable.

The Skunks are allied to the badger, but less subterranean, hunting what small birds, eggs, insects, etc., they can find on the ground, and, though slow-paced, find so much food as to be usually fat. Two species are common here. The large kind *(5. Mephitis occidentalis)* is very much like that common in the Atlantic States, but larger, and black with two white stripes. The other, (6. *Mephitis bicolor)*, found only west of the Mississippi, is only a third the size of the preceding, and has several white stripes and spots. The fur being long, soft and finely variegated, is used to some extent by furriers, who can eradicate the well-known odor of the animal. The skins sell to them for ten to forty cents each.

The Glutton, or Wolverine, (7. *Gulo luscus)*, resembles a skunk in form, but is as large as a sheep, though with short legs. A few are killed every winter in the snowy heights of the northern Sierras. They are noted principally for robbing the hunter's traps, possessing great strength for their size, and dropping from trees on the necks of deer which they kill by biting through the blood vessels. Their skins sell for one dollar to three dollars and fifty cents each.

The Fisher (8. *Mustela Pennantii)* is also a straggler from the snowy north to the summits of the Sierra Nevada, where a few are annually killed. The skins are worth from one to four dollars each, and well known as a material for capes, etc. This animal is chiefly arboreal, and found only in the dense timber, where it hunts birds and small quadrupeds, combining the habits of the dog and cat in its manner of securing prey.

The American Sable, or Marten, (9. *Mustela Americana)*, is also found in the high Sierra—but is rare. Its beautiful fur is well known, and its habits are like those of its larger relative—the fisher. The skin is worth from one to three dollars in its undressed state.

The Mink (10. *Putorius vison)* is more common in the northern parts of the State, and identical with the mink of the Eastern States. Its fur is fine, but less valuable than the preceding. It is a more aquatic animal, living much on fish, but often seeking the barnyard to prey on fowls at night. Its "pelt" is worth three to four dollars.

The Yellow-cheeked Weasel (11. *Putorius xanthogenys)* is peculiar to this State, as far as known. It is very prettily marked with brown and yellow stripes on the head, but its fur is too short to be of value, and its strong odor makes it an undesirable pet, although it might become useful as a rat-catcher, if tamed.

The California Otter (11. *Lutra Californica)* is common in fresh water streams throughout the northern half of this State. It differs only in some anatomical characters from the otter of the Atlantic States and Europe, and its fur is of some value. As is well known, it lives entirely on fish, and is easily tamed, becoming quite docile and playful in captivity, when taken young. The skin is worth from four to five dollars here.

The Sea-Otter, (13. *Enhydra marina),* limited to the North Pacific Ocean, is much more aquatic in habits than the land otter, and goes very far from shore, thus forming a link between the latter and the seals. Formerly very abundant along our coast, its valuable fur has made it such a prize to the hunter that it is now rarely seen, and only killed with great difficulty, on account of its wariness and rare occurrence out of the water. Very little is known of its habits, and specimens even of the bones are very scarce in museums. It has been reported as formerly a common visitor to the larger rivers of this State; but steamboats and hunters have recently kept it away. The skins sell at from thirty to one hundred dollars each to furriers, who export them chiefly to China.

The Cougar, also called American Panther, and California Lion, (14. *Felis concolor)* is a species identical throughout North America, and also found in South America, where it is called puma, etc. It is common in the wooded portions of the State, and dangerous when irritated, though cowardly and nocturnal in habits. It is often killed when preying on the farmer's stock, attacking chiefly young animals. Its flesh is rarely or never eaten, and its skin worth only seventy-five cents to one dollar.

The Jaguar (15. *Felis onca)* is much more like the panther of Asia, being beautifully spotted. A few have undoubtedly been killed in this State, but it is now very rare, though common in Mexico and South America, whence most of the skins are brought, selling here for one to four dollars. The Ocelot *(Felis eyra?)* is said to be found in the southern part of California, but has not been recently confirmed as a native.

The Wild Cat, or Red Lynx, (16. *Lynx rufus*), is abundant throughout California, and noted chiefly for its destruction of poultry, young lambs, etc. It is identical with that of the Atlantic States, but there is a suspicion that the larger and darker colored lynx of Oregon *(Lynx fasciatus)* may also be found in the northern part of this State. Their skins are worth ten to sixty cents only.

The American Civet Cat, called Raccoon-Fox, and Mountain Cat, (17. *Bassaris astuta),* is found quite frequently in the lower Sierras, extending north from Mexico. It is a great pet among the miners, noted for playfulness and gentleness, hunting mice, rats, birds, etc., and having much the habits of the domestic cat. Its fur is rather coarse and valueless.

The Gray Wolf (18. *Canis occidentalis*) is common in the northern and higher districts of the State, as well as throughout the country. Its worthless and cowardly character is too well known to need further notice. The skin is worth from one to two dollars.

The Cayote (19. *Canis latrans*) is found only in or near the region of plains. It combines the characters of the wolf and fox, and its skin is so valueless that it is even of less consequence than the latter, the best bringing only one dollar.

Of foxes, no less than seven species have been described as inhabitants of this State. They vary exceedingly in color, and but two well marked species can be founded on differences in their forms. These are, first, the Long-tailed Fox, (20. *Vulpes macrourus*), which shows the most variation in color, ranging from black to red, with a mixture of gray. The silver variety has been named as distinct, but is said to occur in the same litter with all the other shades. Its skin is sometimes worth twenty-five dollars. Some of them are marked by a cross on the shoulders, and then called cross fox. The smaller red fox of the Atlantic States (*Vulpes fulvus*) is also said to have similar varieties, and may perhaps occur in this State.

The Gray Fox (21. *Vulpes Virginianus*) seems to be identical with the Eastern animal, and differs in many respects from the others, its coarse fur being less valuable, and its habits quite different.

The Island Fox (22. *Vulpes littoralis*) is confined to some of the southern islands, and seems to be merely a small local variety of the gray fox.

The Swift Fox (23. *Vulpes velox*) is a small kind found on the desert plains of the interior, and seems a stunted form of the Red or Long-tailed Fox. A similar variety occurs on the islands. All these species except the silver variety are worth from two to four dollars each for their skins.

The Seal family furnishes several interesting examples along our coast. The Sea-Lions are the most generally known, as they resort in large numbers to the rocks and islands near the shores, where, if unmolested, they allow a very near approach, and opportunities of observing their curious habits. At Seal Rock, near the Golden Gate, they are among the chief attractions to visitors, who resort there in thousands from the city during fine weather. There are similar localities all along the coast, and their not unmusical roaring, mingled with the sound of the waves, gives an animation to the sea-beach not found on our eastern shores. Several species have been named, but there is still some doubt as to the number, as the females are only a third the size of the males, and appear to have been named as distinct animals. Both sexes also vary in size on different islands, those of the Farallones being a third larger than those of Santa Barbara island. Investigations now in progress will decide the question, and the scientific names already given may be mentioned here merely for future reference. (24. *Arctocephalus Gillespii.* 25. *A. Monteriensis.* 26. *A. Californianus,* the latter, perhaps, the same as *Otaria Stelleri.*) The Arctic sea-bear (*A. ursinus*) probably does not come so far south, nor does the walrus (*Rosmarus obesus.*)

The larger Sea-Lions of the Farallones are of little or no value commercially, as they do not furnish oil enough to pay for the trouble and expense of trying it out. The smaller kind of Santa Barbara Island is, however, hunted annually by two or three companies of sealers, who make a profit from about six weeks' work in May and June, but do nothing at sealing the rest of the year. The oil is very impure and dark, and is used by the tanners to dress leather with, for which purpose most of it is exported to New York. Little, if any use has been found for the skins, and the carcasses are left where they are killed. Being fish-eaters, these animals are not very sanguinary in disposition, but rather cowardly, although the males fight fiercely together, always shuffling off into the water on the approach of men, especially where they are much hunted. All these seals have fur of a very similar quality, and their skins, known as hair-seals, sell for only twenty-five cents to a dollar apiece, being those of young animals only.

The Leopard Seal (27. *Phoca Pealii?*) is a small species common on rocks and in bays. It is beautifully spotted, in the same manner as the leopard, but with duller colors, and its skin is of very little value, the hair being thin and coarse. Being very timid and much persecuted by idlers who make a mark of every animal they see, whether they can use it or not, these animals have become cautious and are difficult to approach. They go high up the rivers where the water is clear, in pursuit of fish, as do the young sea-lions.

There is a species of Fur-Seal, (yet undetermined scientifically,) which visits the Farallones and other islands on our coast, in small numbers, being probably the same found abundantly on the coast of Alaska, where the skins form a considerable article of traffic, the price being from one dollar to two dollars and fifty cents each.

The Californian Sea-Elephant (29. *Macrorhinus angustirostris*) was formerly abundant at some seasons on the islands of our coast, but has been exterminated or driven away by the persecutions of sealers, so that few or none can now be found north of San Diego. They resemble the animal so-called found near Cape Horn, but have recently been determined to be a distinct species not mentioned in any work on our Natural History before 1866. They are about equal to the Arctic walrus in size, the males especially, which have also a short proboscis from which their name is derived, though they have not the elephantine tusks of the walrus. They are said to yield as much as sixty gallons of oil apiece, while the sea-lions only furnish ten or twelve, and to be about twelve feet long. Being stupid and easily killed, this curious and valuable animal was destroyed on our coast by the cupidity of the sealers in a very few years after the annexation of California. It is to be hoped that some means may be devised to encourage their return and increase along our shores.

The "Californian" opossum, *(Didelphys Californica),* though thus named, has not been found by naturalists north of the Mexican boundary. It closely resembles that common in the Atlantic States, and in many respects forms a sort of link connecting the Carnivorous with the Insectivorous order. Otherwise, it needs no mention here.

### Order Insectivora—Insect-Eaters.

The Insectivorous order of Mammals is a sort of miniature series, suited for keeping in check the increase of the insect world, just as the Carnivorous kinds do the larger animals. There are not many species known to inhabit this State, and they are little known, their habits being chiefly subterranean or nocturnal.

The Western Mole, (30. *Scalops Townsendii),* is the most common and universally known. It may be considered beneficial to agriculture, as it eats only insects, and the harm it does is chiefly by uprooting seeds and young plants, in its search for their enemies. A very slight inspection of its form and teeth should enable the gardener to distinguish it from the destructive gophers to be hereafter mentioned. Its mode of burrowing is also quite different.

A Star-nosed Mole (31. *Condylura macroura?*) is supposed to be found in California, but not recently obtained. It is remarkable for having a curious excrescence on the end of its nose.

There are two or three species of Shrews found in the northern and mountainous parts of this State, but scarcely ever seen, and then, usually confounded with mice. They resemble these in form of body and limbs, but have the head and minute eyes of the mole. They are nocturnal, and when a cat catches one she leaves it uneaten, on account of a peculiar odor possessed by all the animals of this order. (32. *Sorex vagrans.* 33. *Sorex Suckleyi.* 34. *Sorex ———?)*

### ORDER CHEIROPTERA.

The Bats of this State are also Insectivorous, but form a distinct order, on account of their wings, and some tropical species also live chiefly on fruits.

One found near Fort Yuma, (35. *Macrotus Californicus*), besides being the largest United States species, has a curious leaf-shaped excrescence on the nose, like many tropical bats.

Another, found in the desert east of the Sierra, has ears nearly half as large as its wings, (36. *Synotus Townsendii.*) The other species found here are more or less of the ordinary form of small bats, and need not be especially mentioned. There are about fifteen species known in all, of which nine are also found east of the Rocky Mountains. Full information respecting them is given in Allen's Monograph of North American Bats—a Smithsonian publication—1864. (37. *Nyctinomus nasutus.* 38. *Lasiurus noveboracensis.* 39. *L. cinereus.* 40. *Scotophilus fuscus.* 41. *S. noctivagans.* 42. *S. hesperus.* 43. *Vespertilio subulatus.* 44. *V. evotis.* 45. *V. lucifugus.* 46. *V. obscurus.* 47. *V. Yumanensis.* 48. *V. nitidus.* 49. *V. macropus.* 50. *Antrozous pallidus.*)

### ORDER RODENTIA—GNAWERS.

The "Gnawers" are largely represented in this State, whose luxuriant plains and rich forests furnish them with abundance of roots, grains and mast.

The Beaver, (51. *Castor Canadensis*), identical throughout North America, is quite common in parts of this State where water abounds, as in the Sacramento, San Joaquin and Colorado rivers. Many are killed every winter, but their skins are not so fine as those of more northern regions. They do no special damage, unless by undermining levees, and are so timid as to disappear about as soon as settlements require such embankments, giving place to their relatives, the muskrats, which are far more destructive. The skin is worth from one to two dollars per pound—averaging three to five dollars apiece.

The "Sewellel," or "Mammoth Mole" of the miners, (52. *Aplodontia leporina*), is a very curious animal peculiar to this coast. It has many characters like the beaver, but *no tail*, and is not web-footed, though burrowing chiefly in wet places. It is found in the higher and more northern part of the State—but little is known of its habits. Its fur is of little value, and its flesh poor eating, though preferable to the fishy beaver. It connects the latter animal with the marmots. Their skins are not distinguished by furriers from those of the muskrat, and being smaller, are worth only about ten cents each.

The Yellow-bellied Marmot, also called Woodchuck and Ground-Hog (53. *Arctomys flaviventris*), is found in the northern mountainous parts of California, and resembles in size, habits, etc., the animal so-called in the Eastern States. They are occasionally tamed as pets, and also eaten, though rather coarse, and the skin is used in the country for caps, mittens, etc., being worth only about ten cents. Another species may, perhaps, be found here.

The Grey Ground-Squirrels (54. *Spermophilus Beecheyi*, and 55. *S. Douglassii*) are so numerous and destructive in all parts of the valleys that are not annually inundated, as to be one of the most serious pests of the farmer and gardener. No. 55 is confined to the northern part of this State and Oregon, but differs very little from the more southern species. They are of the size of a half-grown cat, and have a long, bushy tail, like the tree squirrel; but do not ascend trees, except occasionally for food, making their dwelling in the ground, which in many places is full of their burrows for miles together. Although difficult to exterminate, they will probably, in a few years, become as scarce in the settled districts as the Eastern squirrels now are in places where they formerly destroyed nearly all the crops, and had a premium placed on their heads. Our species are considered pretty good eating when properly prepared. There are three other species of this genus not half the size of the above mentioned, and more interesting for their beauty than injurious. 56. *S. elegans* is gray and reddish ; its tail short and flat. It inhabits east of the Sierras. 57. *S. lateralis* is rich brown, with one white and two black stripes on each side—inhabiting the high Sierras. 58. *S. Harrissi* is gray, with a white stripe on each side, and is found only in the desert plains of the southeast part of the State. None of them furnish skins of any commercial value, although the Siberian squirrel, of the same genus, supplies a well known and fine fur.

Of the true squirrels, inhabiting forests only, we have two species. The large Hare-Squirrel (59. *Sciurus leporinus*) is common in the mountains from Santa Cruz north. It is the largest and most beautiful North American species, and considerably larger than the ground squirrels; its fur a fine clear gray, with an exceedingly bushy tail longer than its head and body. It is a favorite game for hunters and supplies a dainty dish for the table, while it is not numerous enough to be destructive anywhere.

The Pine-Squirrel (60. *Sciurus Douglassii*) is not a quarter the size of the other—dark brown, pale below, with a black stripe on each side.

It is found north of San Francisco bay and in the Sierras, and is only interesting as a pet.

The Chipmonks, also called Striped Ground-Squirrels, furnish us with two species. The larger kind (61. *Tamias Townsendii*) is nearly of the size of the pine squirrel, and inhabits both ranges of mountains, as far south as Santa Cruz. The other, (62. *T. quadrivittatus*), a little smaller, is found in the higher Sierras, and eastward to the Rocky mountains. They are beautiful little animals, living in the ground, but ascending trees for nuts, etc., not difficult to tame, especially the last, which is often the familiar guest of the miner's cabin.

The Western Flying Squirrel (63. *Pteromys Oregonensis*) is ascertained to be found as far south as Cape Mendocino, and probably extends much further. It is twice as large as that found in the Eastern States, with fur beautifully soft, and it will no doubt make as interesting a pet as that docile little species, but on account of its nocturnal habits, very little is yet known respecting it.

The Mouse family and its relatives count largely both in numbers of species and individuals. Of those allied to the house-mouse, we have three species, all originally from the Old World. These are the common mouse (64. *Mus musculus*), the Norway rat (65. *M. decumanus*), and the black rat (66. *M. rattus*), all accompanying the spread of settlements and driving out the native species, while the black rat is driven out by its larger relative wherever introduced. Albinos of all are found, especially of the last.

The Wood-Mice and Prairie-Mice are the natives of the soil, and six species are found in various parts of the State, resembling in general form the house-mouse, but larger, and of different colors, proportions, and anatomical structure. They are of no great interest except to naturalists, or lovers of nature, as they do little or no injury to the crops, and are soon exterminated. (67. *H. Gambelii;* 68. *H. austerus;* 69. *H. Boylii;* 70. *H. Sonoriensis;* 71. *H. Californicus;* 72. *H. eremicus.*)

The Wood-Rats have a similar relation to the introduced rats, and abound in certain districts, building high nests of twigs in the woods, but retire before cultivation. One kind (73. *Neotoma occidentalis*) found in the higher and more northern mountains, has a tail very much like that of a squirrel. 74. *N. Mexicana*, and 75. *N. fuscipes*, have bristly tails.

The Field-Mice are common in low meadows, burrowing in the ground, and having short legs, tails, and ears, approaching the form of the gophers. Six species are found in various parts of this State, but have not yet excited much attention by their depredations, although their allies in the East are often destructive. As the larger rodents are destroyed, and the small carnivorous animals which eat them also vanish, these little mice become numerous. (76. *A. Townsendii;* 77. *A. montana;* 78. *A. longirostris;* 79. *A. edax;* 80. *A. Californica;* 81. *A. Oregoni.*)

The Muskrat (82. *Fiber zibethicus*) is like an immense field-mouse, as large as a cat, with webbed feet, and bare, flattened, narrow tail. They are undoubtedly found in this State, though rare in the districts inhabited by their aquatic rival, the beaver. As the latter is destroyed, they will probably increase, and become as destructive to levees, ditches and dams, as they are in the East. Their flesh is uneatable, and the skin has a value of only ten to fifteen cents at the wholesale dealers.

The Jumping-Mouse (83. *Jaculus Hudsonius*) is a little animal allied to the jerboas, with elongated hind-legs and tail, but without cheek-pouches like the similar kangaroo mice. It is found in our higher and northern regions, as well as eastward, but is only interesting as a matter of curiosity, or as a pet.

The Pouched Mice, called Kangaroo Mice and "Gophers," form a peculiar American family, most numerous on the western slope. The latter name, derived from the French, means "digger" and is also applied to species of burrowing tortoise found in the southern Atlantic States and California—an instance of the uncertainty of popular names. The kangaroo mice have very long hind legs, much in the proportions of the Australian kangaroos, and like them can jump amazing distances for their size. The larger kinds are two species, found in most parts of this State, and as large as a half-grown rat. They live chiefly in woods or shrubbery, but sometimes make a home in a retired house, where their hoppings may be heard in the garret at night. Their pouches are in their cheeks, not in the abdomen, as in the kangaroo, which belongs to the opossum tribe. (84. *Dipodomys agilis;* 85. *D. Philippii.*)

The smaller kinds are also of two species, differing from the above in shorter limbs and tails, as well as in anatomical characters. They inhabit the more dry and sandy districts. Both burrow in the ground and live on seeds, being shy and harmless as far as known. (86. *Perognathus parvus;* 87. *P. penicillatus.*)

The "Gophers" furnish us with five species in California, differing in size, color, and somewhat in form. The largest is that most common in the middle counties near the coast, (88. *Thomomys bulbivorus*), and is a great pest to the gardener, burrowing under and destroying many kinds of roots and vegetables. They are kept out by deep trenches or destroyed by the gun, poison, traps, dogs and cats, and yet they are worse to exterminate than the larger squirrels. They vary from the size of a mole to that of a large rat, and though the fur is soft, it is of no value. Full details regarding the anatomy and much of the habits of all the small Rodents, may be found in the Pacific Railroad Reports: Zoology, vols. VI, VIII, X, and XII. (89. *T. laticeps*, confined to the northwest counties ; 90. *T. borealis*, found northward and on mountains ; 91. *T. umbrinus*, found in the southeast quarter : 92. *T. fulvus*, found in the southern parts only.)

The Yellow-haired Porcupine (*Erethizon epixanthus*), is found in the northern mountainous regions of this State. It is of the size of a poodle dog, and resembles closely the Atlantic coast porcupine, except in the color of the hairs which are mixed with the short spines. The animal lives wholly on the leaves and bark of trees, and being easily discovered by the stripping it causes, is soon destroyed, being slow in its movements and not concealing itself much.

The Hare family supplies us with six species differing in size and color, which abound in the open grassy districts. The larger ones only are called hares, (94. *Lepus campestris ;* 95. *L. callotis ;* 96. *L. Californicus*), and are each limited to particular regions, the last being the most numerous west of the Sierra Nevada.

The smaller kinds, called Rabbits, (97. *Lepus artemisia;* 98. *L. Audubonii;* 99. *L. Trowbridgii*), are also somewhat similarly distributed, but the two latter occur together throughout most of the western slope of the State. None of them burrow like the true imported rabbit. Their habits are similar to those of the European hare and of our Eastern rabbits, and they are about alike for food. The quality of their fur is also very similar in all, and of little value. The *L. campestris* turns white in winter.

The Rat-Rabbit, (100. *Lagomys princeps ?*), sometimes called the "Coney," and "Little Chief," is a curious animal, with the general appearance of a young rabbit, as large as a rat, but with *no tail*, and with large *round* ears, the hind legs rather short. It inhabits the Alpine summits of the Sierra Nevada, among enormous granite boulders and banks of perpetual snow, where it must sleep away two thirds of the year.

### ORDER RUMINANTIA—CUD-CHEWERS.

The Elk, or Wapiti, (101. *Cervus Canadensis*), was formerly abundant in most portions of the State, and is still common in the forests of the northern counties, while some exist in the marshes of Tulare valley, visiting the uplands in winter. Their skins are worth twelve to seventeen cents per pound.

The White-tailed Deer (102. *Cervus leucurus*) inhabits the middle and eastern parts of the State, and is scarcely, if at all, distinct from the common deer of the Eastern States (*C. Virginianus*). It is, however, more rare than the black-tailed.

The Mule-Deer (103. *Cervus macrotis*) seems to be limited chiefly to the Eastern slope of the Sierra Nevada, whence it extends to the Rocky mountains. It is remarkable for its long mule-like ears and large size.

The Black-tailed Deer (104. *Cervus Columbianus*) is by far the most common species throughout the State, especially west of the Sierra Nevada, and is quite common a few miles from San Francisco. It has longer limbs, ears, and tail than the *C. Virginianus*, the tail black above, and also differs in color of the body. The skins of all these deer are worth twelve to twenty-five cents per pound.

The American Antelope (105. *Antilocapra Americana*) was formerly found in large herds throughout the dry plains and valleys of California, but is now much restricted in range, though still to be seen in the Salinas and Tulare valleys, as well as east of the Sierra Nevada. Its meat is inferior to that of the deer, and its skin of little value, bringing only eight to fifteen cents per pound.

The Mountain Sheep, or "Bighorn," (106. *Ovis montana*), is found in the higher parts of the Sierra Nevada, and on the mountains east of them, but is not often killed on account of its extreme wariness. It is deserving of domestication on account of its size—twice that of the domestic sheep—its skin, and enormous horns, out of which the northern Indians make many useful utensils. At the time of the first visit to Monterey bay by the Spaniards they found these animals living in that vicinity.

### ORDER CETACEA—FISH-LIKE MAMMALS.

The Whales and their smaller relatives, the Porpoises, abound along our coast, and the business of killing them for oil is carried on profitably at several points, especially in the winter and spring, by companies who attack them in boats, shoot them with the harpoon-gun, and tow them ashore to try out the oil. On account of the difficulty of studying and comparing such enormous animals the species are not well determined, but are known to belong to the following genera, and to differ in most instances from those of the Atlantic.

The "Right Whale" (107. *Balæna mysticetus?*) is believed by whalers to be the same species found entirely around the Arctic circle. A few are killed every year along this coast.

The "California Gray" (108. *Balæna* —— ?) is peculiar to this ocean, but perhaps found near Japan. It is nearly as large as the preceding, and furnishes most of the oil obtained by shore-whalers, as it migrates north and south near the coast in the spring and fall.

The "Humpback" (109. *Rorqualus* —— ?) is so called from a prominence connected with the dorsal fin, peculiar to this genus. It is not a favorite with the whalers.

The Fin-back (110. *Rorqualus* —— ?) is an allied species which does not grow large nor furnish much of the oil collected on our coast.

The Sperm Whale (111. *Physeter macrocephalus*) is generally considered identical in all tropical oceans, and occasionally wanders into temperate seas, but is never killed from the shore unless one should happen to get stranded. They are, however, killed near enough to be counted as Californian, and many cargoes of their oil are annually shipped from San Francisco to the East.

The "Black-Fish" (112. *Globicephalus* —— ?) is a small, round-headed whale, sometimes killed, but not of much economical importance.

The Bay-Porpoise (113. *Phocæna* —— ?) is a large species, sometimes killed for its oil, but not generally considered worth hunting.

The Dolphin-Porpoises (114. *Delphinus* —— ?) are of two or three species, not over five feet long, and rarely, if ever, killed for any purpose, though the flesh of some species is considered eatable.

The Killer (115. *Orca* —— ?) is a kind of Porpoise that goes in companies, and is said to kill the smaller whales by springing from the water and coming down vertically on their heads.

## BIRDS.

Of this class three hundred and fifty species have been positively ascertained to occur within the limits of California, and yet many travelers have asserted that there is a great deficiency of ornithological life, and especially of singing birds. Without undertaking to describe nearly all the species, which our limited space prevents, we can easily show that all the orders of birds common to temperate climates are well represented. The error has arisen partly from the small amount of migration occurring among them in consequence of our equable climate, and partly from the fact that the usual routes of travel pass through the most open plains at a distance from the groves, and where in the dry season comparatively few birds remain. In the following brief notices an attempt is made to distinguish some of the species by mentioning their most striking characters, but this usually applies only to the males, the females and young being often quite different in colors, as are the males of many small birds in winter.

## LAND BIRDS.

### ORDER SCANSORES—CLIMBERS.

These birds are analogous to the monkeys among mammals, suited for a life among or on the trees, but also capable of living in a variety of conditions, and therefore entitled to rank the highest of their class. The parrots are familiar to every one in a domesticated condition, and are well known to excel all others in intelligence. None of these have yet been found native within our limits.

The Road-Runner, Chaparral Cock, Paysano, Snake-killer, Racer, etc., for it is called by all these popular names (1. *Geococcyx Californianus*), is nearest allied to the cuckoos as indicated by its generic name, meaning ground-cuckoo, but presents us with a curious modification of that arboreal family, suited for existence in nearly treeless regions, and has therefore been always a puzzle to amateur ornithologists, many of whom insist that it is an ally of the pheasant, because it can run swiftly, seldom ascends trees (and then only by jumping or climbing), and can only fly at a downward inclination. They therefore assert that it must be a good game bird, although it feeds on snakes, lizards, etc., and is in every respect unfit for food. It is, however, one of the most curious and interesting birds of this State, having no representative in the East, and but one in Mexico.

The Yellow-billed Cuckoo (2. *Coccygus Americanus*) is found in the interior valleys in summer, as well as in the Atlantic States, where it is often called Rain Crow, on account of uttering its cackling notes so frequently before a rain, as to be considered a very good prophet. Here, however, there is little or no rain during its residence, which is only from April to September. It has not the peculiar habit of the European cuckoo, which has given that bird a dishonest reputation; but is a robber of birds-nests, like its relative just mentioned, and of no particular interest except to lovers of nature.

The Woodpecker family has no less than fifteen species in this State, nearly all distinct from the eastern, and among our most beautiful birds. The typical genus has five small species, of the group often called Sapsuckers, although the little injury they do to the bark of trees is fully compensated by their destruction of large numbers of insects. They are usually mottled or barred with black and white, the males with red caps; but one species is black, with a white head. (3. *Picus Harrisii;* 5. *P. Gairdneri;* 6. *P. Nuttalli;* 7. *P. scalaris;* 8. *P. albolarvatus.*) From one to three of these species, together inhabit the various wooded portions of the State; the two last only the more eastern.

Next to these is the Arctic Woodpecker (9. *Picoides arcticus*), found with us only in the subalpine mountain regions, whence it extends to the northern limit of forests and the northern Atlantic States. It is remarkable for having only three (instead of four) toes on each foot, a yellow cap and black and white body.

The fourth group (10. *Sphyrapicus nuchalis;* 11. *S. ruber;* 13. *S. Williamsonii;* 13. *S. thyroideus*) are handsome birds of various plumage, rarely seen out of the forests, where they frequent chiefly the deciduous trees, and are said to subsist in part on the inner bark of these, as well as on berries and insects. All are confined chiefly to the Sierra Nevada, except the second, which visits the Coast Range in winter near San Francisco, and is to be known by its blood-red head, neck and breast.

The Pileated Woodpecker, or Log Cock, (14. *Hylatomus pileatus*), is the only one with a true crest of elongated red feathers found here, (and also in the East). It is also very large, being equal to a pigeon in size. It is found in the denser forests, feeding on the insects it extracts from rotten wood, and is almost entirely black except its crest. On account of this crest, which careless observers suppose to be like a cock's comb, it is absurdly called Woodcock, and thus confounded with a game-bird of the snipe family not found on this coast.

The Gila Woodpecker (15. *Centurus uropygialis*) is a beautiful species of middle size, found only along the lower Colorado and southward.

The California Woodpecker (16. *Melanerpes formicivorus*) is often called "Carpintero," which is, however, only the Spanish name of all these "hammerers." It is one of the most beautiful species, common west of the Sierras and in Mexico, its plumage varied with steel-blue, red, yellow, black and white. It is remarkable for the habit it has of boring numerous holes in the soft bark of trees, in each of which it places an acorn, accurately fitted and driven in. These acorns usually contain young grubs, which eat out the contents of the nut, and having grown large, becomes dainty food for the provident bird.

Lewis' Woodpecker, called also the Collared, (17. *M. torquatus*), is a very beautiful bird, dark-green, with red on head and breast. It is not very industrious, preferring to catch insects in every way except by pecking decayed wood, and living largely on fruits. It is common in all except the southern counties, especially in coniferous forests.

The "Flickers," or "Highholes" (18. *Colaptes Mexicanus,* and 19. *C. chrysoides*) are peculiar woodpeckers, with curved bills, of rather large size, the first with the quills and tail-feathers red beneath, the latter having them yellow. Their beautiful plumage is otherwise very similar, but too varied to describe here, and nearly resembles that of the eastern species (*C. auratus*) generally well known. They live in great part on berries, and on ants, which they search for on the ground, thus showing some resemblance to the ground cuckoo. Being large and common, they are often killed and eaten, though inferior for the table. The second species is found only in the southeast counties.

### ORDER RAPTORES—BIRDS OF PREY.

These are analogous to the Carnivorous Mammals, and like them give us three groups of species, which may be called diurnal, nocturnal, and carrion-eaters, although these are not the only characteristics distinguishing them, nor strictly natural, any more than such divisions of carnivora are. The diurnal birds of prey, on account of their ferocity and noble appearance, which only hides a tyrannical character, are the kings of birds in the same sense as the lion is of beasts, but as much below the parrot in intellect as the lion is below the monkey.

The White-headed Eagle (20. *Haliœtus leucocephalus*) usually adopted as the emblem of the United States, is an abundant species wherever it has not been exterminated by the murderous gun. The Spanish settlers encouraged them on account of their destruction of ground squirrels, and they seem rarely to have violated the trust thus shown them by killing domestic animals, although they undoubtedly will sometimes destroy a young ox, weakly lamb, or fowl. Partly to *prevent* this, partly for the empty honor of "killing an eagle," the American settlers are destroying them so fast that soon they will be scarce enough to satisfy the most destructive mind.

The American Golden Eagle (21. *Aquila Canadensis*) is much less numerous, but occasionally seen along the coast, preferring the lofty mountains. It is large, yellowish-brown, and its legs are booted with feathers down to the toes.

The Fish-Hawk (22. *Pandion Carolinensis*) is allied to the eagles, but lives entirely on fish, which it catches by diving, and is found near all the clear waters of the State, both fresh and salt.

Two other large eagle-like birds, with some resemblance to vultures, are found, but rarely, in the southeast part of the State, and have been described by various authors under the following names: (23. *Craxirex unicinctus,* 24. *Polyborus tharus.*)

The Buzzard-Hawks are next in size and more numerous. The "California Squirrel-hawk" (25. *Archibuteo ferrugineus*) is the most common, being found all the year on the borders of the plains inhabited by the squirrels, of which they destroy great numbers, but, like their relatives, unfortunately do not distinguish between wild and tame birds, so that they often feel the vengeance of the farmer. Their large size and feathered legs distinguish this species. Another smaller one (26. *A. lagopus*) comes from the north in winter, and is much more marked with white. A variety or species entirely black is also sometimes found, (*A. Sancti Johannis,* named from resemblance to the black eagle of St. John, represented in old pictures.)

Another group, often called Chicken-Hawks and Buzzards, have the legs bare, but otherwise resemble the preceding. There are so many forms differing but little except in color, that naturalists are puzzled whether to consider them of two or more species. Eight have been described as found in this State, which are of two groups as to size, and may be considered analogous to the varieties of color found among our wolves and foxes. Besides this, the young of the first year are very similar in all. The larger group is about half the size of the Eagles, comprising *Buteo borealis,* and varieties (?); 27. *B. montanus;* 28. *B. calurus;* 28. *B. Cooperi; B. Harlani;* the last nearly all black. The other comprises *Buteo Swainsoni,* and varieties (?); 30. *B. insignatus; B. Bairdii; B. oxypterus;* 32. *B. zonocercus;* the last again black, but perhaps a good species. (Those not numbered have not been detected in California.) The three first of the large group have red tails when mature, while the smaller ones all have the tails banded, as do the young of the others. All these are heavy, slow-flying hawks, feeding usually on small birds, mice, etc., but sometimes catching domestic poultry, and usually shot on suspicion by farmers, although it might be better to merely use very fine shot, which would sting them and drive them to their wild prey without killing them.

The Marsh-Hawk (33. *Circus Hudsonius*) is a very common, large, and well known kind, found about every level plain and marsh, where they kill mice and small birds, rarely attacking poultry, and soon learning to let it alone. The white rump is a conspicuous mark of the species, though the younger birds are elsewhere brown, and the old ones ash-color above. It is found throughout North America.

The White-tailed Hawk (34. *Elanus leucurus*) is about half the size of the last; a beautiful gray and white bird, with black shoulders. Its habits are similar, and it is found, rather rarely, near this coast, as well as near the Gulf of Mexico.

A more bold and destructive group, although smaller than most of the preceding, may be distinguished as Hawks proper. There are three species, scarcely differing except in size, especially in their young plumage, in which most of them are killed. They are more light and slender in form, with longer limbs, but weaker claws and bills, yet they do not fear to attack birds larger than themselves, and are among the kinds most destructive to poultry, their swiftness enabling them to catch it unawares. The largest is about the weight of a hen—the smallest that of a jay. (35. *Accipiter Cooperii;* 36. *A. Mexicanus;* 37. *A. fuscus.*)

The Goshawk (38. *Astur atricapillus*) is similar in form, but larger and scarcely ever seen far from the thick forests where they hunt ducks, rabbits, and other animals of similar size. This species is found only in Northern America.

The Falcons proper are by many considered typical of the birds of prey, though smaller than the eagles, etc., but they show much resemblance to the owls, though diurnal, and are analogous to the foxes. We have four species.

The Western Duck-Hawk (39. *Falco nigriceps*) frequents the seashore chiefly, and, though only a quarter the size of an eagle, boldly seizes ducks and other birds as large as itself. Being swift and strong, it is one of the most destructive species, and often carries off a fowl to its inaccessible nest among the cliffs before the farmer knows it has been near.

The Hare-Hawk (40. *Falco polyagrus*) holds a similar position inland, and is, of course, more destructive to fowls, but its wariness protects it much more than the sluggish and larger buzzards.

The Pigeon-Hawk (41. *Falco columbarius*) is of the size of a pigeon, and proportionately destructive. It is also common in the East.

The Sparrow Hawk (42. *Falco sparverius*), also numerous throughout America, is of the size of a Jay, beautifully colored, and can be considered only as a benefactor to the farmer, as it lives on mice and small birds, never attacking chickens unless they are very young.

The nocturnal species are all called Owls, although some are nearly as much like hawks. If the Lion family is the highest of Carnivora, as some contend, so are the owls among birds; for they are strictly analogous, and both have members nearly or quite diurnal in habits.

The Great Horned Owl (43. *Bubo Virginianus*) is common throughout North America, and of the size of our largest Hawks. It lives chiefly in forests or caves, and preys only at night, occasionally taking a chicken off the roost if exposed, and is said even to kill turkeys. Like other owls, however, they kill more rats and mice than anything else, because those animals also move about at night and are more easily found than the roosting birds. There are three smaller species found here which have little tufts of long feathers on the head called "horns" or "ears," though apparently designed only to make them look like cats.

The Short-eared Marsh Owl (44. *Brachyotus Cassinii*) visits us only in the cold months, when large numbers of them are sometimes seen in the meadows, hiding in long herbage, and in cloudy weather hunting mice, etc., by day. They are half the size of the last, pale in color, and do little or no damage.

The Long-eared Owl (*Otus Wilsonianus*) is much smaller, gray, and lives permanently in all parts of this State in hollow trees. They occasionally visit the farm-yard at night, but do not molest full-grown poultry.

The Mottled Owl (*Scops asio*) is common like the last in all of North America, and lives in similar localities. Being smaller than a pigeon they do little or no harm—in fact, sometimes take up a residence in the dove-cot without apparently killing any of the old birds, though a great terror to them and all smaller kinds.

Of the Smooth-headed Owls, the Barn Owl (47. *Strix pratincola*) is about equal in size to the short-eared. It is found in nearly all the United States, and closely resembles the Barn Owls of Europe and Australia. Though fond of barns, ravines and caverns, they often content themselves with the shelter of thick bushes, and ought to be protected, as they are found by close observation to live almost entirely on rats and mice. They are yellowish above, pure white beneath.

The Great Gray Owl (*Syrnium cinereum*) is as large as the Great Horned Owl, or larger, and found only in dense forests throughout the more northern and subalpine parts of America.

The Western Barred Owl (*Syrnium occidentale*) has been found so far only at Fort Tejon. It is marked by bars or bands of color, passing entirely round the body like the Eastern species.

Two little species allied to these are rare in this State. They are smaller than Pigeons, and frequent the forests, doing no harm. (50. *Nyctale Acadica*, and 51. *N. albifrons.*)

The Burrowing Owl (52. *Athene cunicularia*) is numerous and well known, being almost diurnal in habits, and living in burrows made by the ground squirrels, though sometimes burrowing for itself. It is of the size of a pigeon, and destroys many mice and insects. Although found in western South America, it differs from the species found east of the Rocky Mountains, (*A. hypogœa.*)

The Gnome Owl (53. *Glaucidium gnoma*) is also partly diurnal, only about six and a half inches long, its legs densely feathered, and lives chiefly on insects. It inhabits only the western slope of North America.

Whitney's Owl (*Micrathene Whitneyi*) is still smaller, its legs nearly bare, and has been found so far only in the Colorado valley. Its habits, as far as known, are like those of the last.

The Vultures, although classed with the birds of prey, are rather to be called scavengers, as few species attack any living animals unless diseased or helpless. They have not the talons of the other species with which to seize prey, and their beaks are not so strong and sharp. They are thus analogous to coyotes or jackals.

The California Vulture (55. *Cathartes Californianus*) is remarkable as the largest land bird that flies north of the Andes, where the much larger Condor is met with. It is, however, scarcely heavier than a large turkey, and not so wide in spread of wings as our Albatross. This fine bird is found throughout the western slope of North America, and abounds where herds of large animals are to be seen, soaring generally at such a height as to be almost imperceptible, until it perceives a dead or dying animal, even at a distance of many miles, when it sweeps rapidly down to it, and in some districts a dozen vultures gather to the feast in a few minutes, from the distant sky, where none were visible to human vision before. As a useful bird, this and the next should be protected by law from reckless slaughter. This species may be distinguished at a great height by its wings having a white patch underneath.

The Turkey Vulture, also called Buzzard, (56. *Cathartes aura*), is only about half the size of the other, and is named from its bare head and neck being red, like those of a turkey. It is more common and found in nearly all the United States.

### ORDER INSESSORES—PERCHERS.

This division of birds includes most of the smaller land species, and may be conveniently divided into the omnivorous, insectivorous, and granivorous groups, corresponding to the *Cheiroptera*, *Insectivora*, and *Rodentia* of mammals. Although this arrangement is not the most scientific, it is the most intelligible, and as nearly correct as is necessary for our purpose.

### *Group First—Omnivorous Perchers.*

It has already been stated that many climbers are omnivorous, and so are some of other orders. The present group comprises some lately included among the singers, but not properly musical, unless taught to whistle, being very imitative.

The American Raven (57. *Corvus carnivorus*) is a common bird in California, especially in desert regions. It has many of the habits of the vulture, being a scavenger, though occasionally killing small animals for itself.

The Western Crow (58. *Corvus caurinus*) is a third smaller than the raven, and more gregarious, but otherwise much resembles that bird. It appears to differ from the eastern species.

Nuttall's, or the Yellow-billed Magpie (59. *Pica Nuttalli*), is common in the valleys west of the Sierra Nevada, and a very beautiful bird, differing but little from that of Europe. It has the same cunning, mischievous habits, and eats anything it can catch or steal. The Black-billed Magpie (*Pica Hudsonica*) is probably also found east of the Sierras.

Steller's Jay (60. *Cyanura Stelleri*) is a dark blue species, with black head and crest, found in all the coniferous forests along this coast.

The California Jay (61. *Cyanocitta Californica*) is a light blue, uncrested species, inhabiting the oak and other woods in the valleys. It is known from the next by being white beneath.

Maximilian's Jay (62. *Gymnokitta cyanocephala*) is entirely dark blue, crestless, and inhabits the juniper groves near the summits and eastern slopes of the Sierras, feeding on berries and anything else eatable.

The American Nutcracker, or Clark's Crow (63. *Picicorvus Columbianus*), is a sort of Jay inhabiting the pine forests near the crests of the Sierra and northward, feeding on their seeds, occasionally on insects and berries. It is light gray, with black and white wings, and very noisy, large flocks chattering through the forests.

The Canada Jay (64. *Perisoreus Canadensis*) is only about half the size of the other jays, light gray like the last above, and yellowish-white beneath. They are scarce in this State except near the summits of the mountains, and extend north to the Arctic circle.

The Belted Kingfisher (65. *Ceryle Alcyon*) is abundant along this coast and throughout the United States. It seems to feed wholly on fish, but some foreign species eat insects and berries. It is said that the smaller Green Kingfisher (*Ceryle Americana*) is found along the Lower Colorado, as well as on the Rio Grande and southward.

### *Group Second—Insectivorous Perchers.*

This includes a large number of species, of which we can only mention particularly the most striking or interesting.

The Flycatchers are mostly rather plain plumaged birds, living chiefly on insects which they catch on the wing, though usually sitting perched on some high branch or shrub, watching until their prey comes near. The first genus comprises those called King-birds, Bee-birds, and Tyrants. The first is black and white, the other two gray, white and yellow—all with a red spot in the middle of the crown, and about six inches in length. Only the first is found east of the Mississippi. (66. *Tyrannus Carolinensis;* 67. *T. verticalis;* 68. *T. vociferans*). Another, of similar habits, is smaller and plainer, without a red crown. (69. *Myiarchus Mexicanus.*)

Two species are of the same genus as the well-known and favorite Pewee, or Phœbe, of the East, and similar in habits. The first, black and white, is a constant and familiar resident about houses west of the Sierras. The other lives in summer on their eastern side, only visiting us in winter. It is mostly brown in color. (70. *Sayornis nigricans,* and 71. *S. sayus.*)

Then we have a group of six small, plain species, which are scarcely noticed except by naturalists, though each has peculiarities interesting to the lover of nature. (72. *Contopus borealis;* 73. *Empidonax Richardsonii;* 74. *E. Traillii;* 75. *E. flaviventris;* 76. *E. Hammondii;* 77. *E. obscurus.*) One alone of the northern flycatchers has a brilliant red color, with black wings, and this is found only along the Colorado and southward. (78. *Pyrocephalus Mexicanus*)

The Poorwill (79. *Antrostomus Nuttalli*) is only half as large as the eastern Whippoorwill, and its nocturnal cry sounds like "Poor Will," as if answering in a plaintive, pitying tone, the harsh command of that bird. It is a summer visitor, and common in many wooded districts, though oftener heard than seen, being nocturnal.

The Night Hawk (80. *Chordeiles popetue*) is the same species found throughout the Atlantic States, and also visits us in summer, but remains during that season in the northern part of the State or on high mountains. The night hawk family has the same relation to the flycatchers, as have the owls to the true hawks.

The Humming-birds, those tropical gems, are more partial to our State than any other north of Mexico, and one or two species even spend the winter with us. All are distinct from the single species found in the Eastern States.

The Purple-throated Hummer (81. *Trochilus Alexandri*) is green, with the throat a brilliant violet-purple. It frequents the valleys near the coast. The Rufous Hummer (82. *Sclasphorus rufus*) is fox-colored, with the throat brilliant scarlet, and frequents only the coast and high mountains in summer, going far north of us also. The Broad-tailed Hummer (83. *Sclasphorus platycercus*) is green, with a red throat, and is found east of the Sierras. The Anna Hummer (84. *Atthis Anna*) is the largest we have, green, with the entire head brilliant metallic-red. It is common along the coast, and winters in the southern counties. The Coast Hummer (85. *Atthis costæ*) is found also inland to the Gila river ; it is green, the entire head metallic-violet. The Calliope Hummer (86. *Callothorax calliope*) is a little known Mexican species, found as far north as Fort Tejon.

The females and young of all are very similar to each other, metallic-green, without the more brilliant feathers of the head or throat. They all eat small insects as well as suck honey from flowers.

The Swallows are numerous in species and individuals, forming two groups, one plain, the other quite varied in plumage. The first are also allied to the hummers in anatomical characters. They are called "swifts," and "chimney swallows," although none of them among us inhabit chimneys, but prefer lonely forests or rocky cliffs, where little of their habits has yet been observed. (87. *Panyptila melanoleuca*, 88. *Nephocœtes niger*, 89. *Chætura Vauxii.*)

Of the true swallows we have seven species. The Bank Swallows (90. *Cotyle riparia*, and 91. *C. serripennis*) are plain brown and white little birds, nestling in holes burrowed in sand-banks, and found also eastward. The Barn Swallow (92. *Hirundo horreorum*) is well known as an inhabitant of the entire country.

The Cliff Swallow (93. *H. lunifrons*) is much more abundant here, and its bottle-shaped nests of mud are built in every favorable situation throughout the warm parts of the State.

The Bicolored Swallow, (94. *H. bicolor*), dark-green above, white below, is also common, building in knot-holes, bird houses, and other similar places, and some remain in this State throughout the year.

The Sea-green Swallow (95. *H. thalassina*) is a small kind, varied with rich green, purple, black and white, frequenting the oak groves, and not found in the East.

The Purple Martin (96. *Progne purpurea*) is a large and beautiful swallow, common in summer in all the interior of the State, where it shows the same familiar disposition, and gives us the same musical notes as in the Atlantic States.

The Waxwing (97. *Ampelis garrulus*) is a beautiful bird, found throughout Northern America and Europe, but rare in this State as far as known. The smaller species, often called Cedar-bird, or Cherry-bird (98. *Ampelis cedrorum*) is common in the regions where berries abound, and is increasing in numbers as the small fruits are more cultivated, though living in great part on insects also. It is very similar to the preceding, but smaller, and when fat considered very good eating.

Two birds allied to these, and peculiar to this coast, deserve notice. The Shining Flycatcher (99. *Phainopepla nitens*) is a beautiful steel-blue-black species, found along the Colorado and Sierras, possessing some melody of song, unlike the waxwings.

Townsend's Flycatcher (100. *Myiadestes Townsendii*) should be called a nightingale, on account of its charming song, and resembles that celebrated bird in its plain brownish plumage, varied with white. It seems to frequent chiefly the juniper groves on the eastern flanks of the Sierras, occasionally appearing on their western side. It resembles in appearance the king-birds.

The Shrikes, or Butcher-birds, are of two species. The Northern, (101. *Lanius borealis*), found also in the northeastern States in winter, is very much like the mocking-bird in general appearance, but has little melody, and is notable as the most rapacious of our insectivorous birds, killing even mice and sparrows, which it either eats, or leaves suspended on a thorn or branch until wanted. The Western Shrike (102. *L. excubitoroides*) is a common resident throughout the State, and is often seen perched on a telegraph-pole or wire, watching for grasshoppers or young mice.

The Greenlets, or Vireos, seem to come nearest to the shrikes, though quite different in plumage, being more or less olivaceous, yellow, and white. We have three or four small species, difficult to distinguish from Eastern kinds, but all easily known to the field naturalist, by the differences in their melodious songs. They live entirely in the groves, each preferring peculiar kinds of trees, feeding on insects and berries. (103. *Vireo Swainsonii*, 104. *V. solitarius*, 105. *V. Huttoni*, 106. *V. pusillus*).

The Tanagers are among our most brilliant plumaged songsters. The Summer Tanager (107. *Pyranga æstiva*), common in the Atlantic States in summer, is also found in the Colorado valley. The male is entirely brilliant red; the female olive.

The Western Tanager (108. *Pyranga Ludoviciana*) is yellow, wings and back black, head red; the female entirely yellowish. This species spends the summer in this State and northward, and is brilliant both in plumage and song.

The Yellow-breasted Chat (109. *Icteria longicauda*) is olive-green above, yellow beneath. It scarcely differs from a common Eastern species, and is one of our finest songsters, frequenting river banks and thickets, where it sings in summer both by day and night, often flying at the same time with antic jerks and odd notes, as if it held the place of buffoon among the small birds.

Twelve small species follow, known by the general name of Warblers, and as only those who have the desire and means of observing them closely, can know the many interesting facts connected with the variations of their beautiful plumage, the sweetness of their songs and the details of their habits, we must limit this notice to the names by which further information may be obtained from other authors. (110. *Geothlypis trichas;* 111. *G. Macgillivrayi;* 112. *Helminthophaga celata;* 113. *H. ruficapilla;* 114. *H. Luciæ;* 115. *Dendrœca occidentalis;* 116. *D. nigrescens;* 117. *D. coronata;* 118. *D. Audubonii;* 119. *D. æstiva;* 120. *D. Townsendii;* 121. *Myiodioctes pusillus.*) Numbers 110, 112, 113, 117, 119 and 121 are found also in the Atlantic States.

The American Titlark (122. *Anthus Ludovicianus*) is a little bird of plain brownish plumage, visiting the whole United States in winter; to be seen running along roads, water-courses, and roofs of houses, even in the cities, pursuing insects, and constantly jerking its tail. In its far northern summer resort it is said to show fair musical powers in the spring.

The Water Ousel (123. *Hydrobata Mexicana*) is a very curious bird, little larger than a sparrow, entirely slate color and with a short tail, which lives on the shores of mountain torrents and feeds on water insects, which it obtains by diving, swimming, walking or flying, under water. Though not web-footed, it shows more power of locomotion in this element than many truly aquatic birds, and has besides a sweet song usually uttered during spring, as the male sits on some rock in the brook, and the female is perhaps on its nest. This is built entirely of mosses, generally under a dam or rill where the water trickles over the roof, keeping the nest green and thus concealed. The Thrush family, of which the Ousel is one, furnishes us with several other species.

The Robin-Thrush (124. *Turdus migratorius*) though resembling the European robin only in its red breast, has also become a favorite in America. It is well known as a good singer, familiar and harmless in habits, and unfortunately is considered good eating in winter. With us it spends the summer in the wooded mountains, but wanders in winter throughout the State.

The "Oregon Robin," (125. *Turdus nævius*), much more beautiful, but an inferior singer, is only a winter visitor to California. It is of a fine, clear gray above, the breast orange-brown, with a black belt, two orange stripes on the head, and two on each wing.

Two smaller and plain brown Thrushes, with spotted breasts, are common here, the first only in our northern counties, in winter; the second, smaller, and a constant resident. Both have a loud ringing bell-like song, without variety, but enlivening the woods in which they live. (126. *Turdus ustulatus*, 127. *T. nanus.*)

The Western Bluebird (128. *Sialia Mexicana*) is dark-blue, with the middle of back and breast chestnut, and is the common kind at all seasons in the lower districts. The Arctic Bluebird (129. *Sialia arctica*) is entirely sky-blue, and lives during summer about the summits of the Sierras, visiting the coast only in winter. The bluebirds are, like the closely allied species of the East, great favorites, both on account of their beauty and song, being also very familiar if encouraged to build a nest about the house.

The Kinglets are the smallest of our birds, next to the Hummers, and like the Kingbirds, have a brilliant spot on the crown of the head. The Golden-crowned (130. *Regulus Satrapa*) is found only in the high Sierras in summer, though common in winter in the colder Atlantic States. The Ruby-crowned (131. *Regulus calendula*) is abundant in winter throughout this State, but retires to cooler regions in summer. This also is a common Eastern winter bird.

Between these and the true Wrens, we have a group of Thrush-like birds, generally plain in plumage, but containing some of the finest songsters in the whole feathered race.

The famous Mocking-bird (132. *Mimus polyglottus*) is represented here by a form scarcely distinct, but with a longer tail than the Eastern bird. It has the same plumage, and the same brilliant variety of song. It is found only in the southern counties, and remains there in winter.

The Bow-billed Thrushes, often called false Mocking-birds, come nearest to the Eastern Brown Thrush in appearance and melody; but our three species are uniform brown or gray, without spots on the breast. The only one common west of the Sierras is the first next mentioned, and this frequents dense thickets at all seasons, singing in spring with considerable melody and imitative powers. The other two are found in the Colorado valley and neighboring deserts, where they have precisely the same habits and sing similarly. (133. *Harporhynchus redivivus;* 134. *H. crissalis;* 135. *H. Lecontii.*)

The Mountain Mocking-bird (136. *Oreoscoptes montanus*) is like the common mocker, but with a spotted breast, and is smaller. It is nearly equal in melody, and is confined to the southern and eastern parts of this State, extending to the Rocky Mountains.

The Cactus-Wren (137. *Campylorhynchus brunneicapillus*) is a link between the mockers and true wrens, but has only a few loud-ringing notes, which enliven the barren cactus thickets which it inhabits in the southern counties. It builds a large and curious nest, woven of grasses in the shape of a sleeve, and laid horizontally on the cactus bush. It is brown, the breast white and spotted.

Of the Wrens proper, little brown birds, with various black and white markings, inhabiting hollow trees, buildings, rocks, etc., we have eight species, all presenting curious and interesting variations of song and habits which cannot be detailed in this brief summary. They are called, from the chief peculiarities of each, Mexican, Rock, Wood, Marsh, House, Winter and Ground-Wrens. (139. *Catherpes Mexicanus;* 140. *Salpinctes obsoletus;* 141. *Thryothorus Bewickii;* 142. *Cistothorus palustris;* 143. *Troglodytes Parkmanni;* 144. *T. hyemalis;* 145. *Chamœa fasciata.*) The third, fourth and sixth are also found in the Eastern States; the others are more or less diffused through California.

The American Creeper (146. *Certhia Americana*) is a curious little wren-like bird which lives only in the forest, chiefly northward, climbing up and down the trunks of large trees, from which it can scarcely be distinguished in color when at rest, and utters only a shrill, wiry cry.

The Nuthatches are little birds, blue above, white or reddish beneath, and similar to the creeper in habits. Three species live in this State, the first also found eastward. (147. *Sitta Canadensis,* 148. *S. aculeata,* 149. *S. pygmœa.*)

The Titmice are also very small, like miniature jays in appearance, and of various plumage. Three little leaden-blue kinds, with black and white tails, frequent low bushes in summer, with the habits of warblers, but little song. The first species is found also eastward, the others are limited to our southern and eastern counties. (150. *Polioptila cœrulea,* 151. *P. melanura,* 152. *P. plumbea*). The Plain Titmouse is a little gray-crested bird inhabiting the oak groves, and having considerable imitative melody. (153. *Lophophanes inornatus*).

The "Chickadees," well known by their note, resembling this name in sound, are little gray birds, with black caps or stripes on the head, found in the mountain regions, and all distinct from the Eastern and

European species of very similar plumage. (154. *Pœcila occidentalis,* 155. *P. montanus,* 156. *P. rufescens*).

The Least Titmouse (157. *Psaltriparus minimus*) is a curious bird, scarcely larger than a hummer, but with a long tail for its size, and short wings, its color plain grayish brown. They inhabit oak groves, going in flocks from tree to tree in search of insects or seeds. The nest is extraordinary for the bird, being a foot long, composed of mosses chiefly, and suspended from a branch, the entrance being in the side.

The Yellow-headed Titmouse (158. *Auriparus flaviceps*) is a more gay plumaged little bird, inhabiting the Colorado valley, and southward. It also builds a large and curious nest of thorny twigs, laid flat on a branch, and with a hole in the side.

The Shore-Lark (159. *Eremophila cornuta*) is a pretty little bird, brown, with yellow forehead and throat, sometimes called horned lark, from long erectile tufts over the eyes. It is common at all seasons in the open plains and fields, and in spring sings sweetly while flying high in the air, like the European sky-lark. It is entirely a ground bird, never alighting on trees, and is found throughout North America.

The Meadow-Lark (160. *Sturnella neglecta*) scarcely differs from the Eastern bird of same name. It is as large as a dove, mottled with brown, white, and black above, its breast yellow. Scarcely a grassy field or plain can be found in this State without them, and they are shot in considerable numbers on account of their size, and white, though tasteless flesh. Their sweet but brief songs are heard at all seasons where they abound.

The Western Oriole (161. *Icterus Bullockii*) is a very beautiful bird, brilliant orange, with black back and wings, the latter with a white patch. They are numerous in summer in every grove, and their songs are among the finest and almost constantly to be heard, while their preference for the vicinity of houses, harmlessness and beauty, make them as great favorites as their Eastern cousins. They build beautiful hanging nests.

The Hooded Oriole (162. *Icterus cucullatus*) is found only in our most southern counties and in Mexico. It resembles the preceding in song and habits, but is not so brilliant in plumage.

The Yellow-headed Blackbird (163. *Xanthocephalus icterocephalus*) is a large species found only west of the Mississippi, the male black, with yellow head and a white patch on the wing ; the females plainer. They are gregarious, associating in large flocks, chiefly on the interior plains, and sometimes taking their pay for the grubs they destroy by eating a little grain. Their notes are harsh, and they are generally of little interest.

The Redwing Blackbirds are of three species, only the first of which is found in the East. The males are very much alike, differing chiefly in the red patch on the shoulder, which, in the first is edged with yellow, in the second with white, in the third entirely red, the rest of their plumage being black. The females are brownish. They frequent the inland marshes in immense flocks, and are more or less common about every wet tract, sometimes committing considerable depredations on grain fields, though at most seasons they live chiefly on insects. Their songs are very similar, without much melody, and they are deemed rather poor eating. (164. *Agelaius phœniceus;* 165. *A. tricolor;* 166. *A. gubernator.*)

The Purple-headed Blackbird (167. *Scolecophagus cyanocephalus*) is greenish black, the male with the head shining purplish ; the females brownish. They are the most common species in the drier parts of the State, but associate with the other blackbirds, and are found everywhere. They accompany cattle in the fields, and follow the plough to pick up grubs, etc. They have a rather harsh song, which, however, sounds well when they sing in concert.

The Cow-Blackbird (168. *Molothrus pecoris*) is the same species found throughout the United States, but on this coast is less common, and keeps away from the sea-shore. It is well known from the peculiar habit of the female, a plain brown bird, of laying its eggs only in other bird's nests, never building itself, thus resembling the European Cuckoo. The male is black with purplish tints, the head and neck sooty-brown. It is the smallest of our species, and prefers the society of cattle, frequenting the trains crossing the plains in great flocks. Its song is harsh and unmusical.

We now come to the granivorous birds, known by a short, conical bill. The last named has nearly this form of bill, and indeed, nearly all after the Wrens eat seeds more or less, though not so exclusively as the following, and are sometimes called omnivorous.

### *Group Third—Granivorous Perchers.*

These are the birds which, on account of their living so much on seeds, are most easily kept in cages, though some of the preceding group surpass them as singers. They are divisible in this country into two nearly equal series, the first notable for variety of coloring in the males, the second of very plain species.

The Pipilos, often called Chewinks and "Ground Robins," have somewhat the form of the *Molothrus*. Two species are black, with breast and sides reddish, wings and tail spotted white, frequenting low bushes and oak groves, the second northward. (169. *Pipilo megalonyx;* 170. *P. Oregonus.*) Two others are plain brown, the second with black about the eyes, and found only east of the Sierra, while the first is common west of them. (171. *Pipilo fuscus;* 172. *P. Abertii.*) The fifth species is grayish, with green wings and tail, and frequents the high Sierras in summer, (*Pipilo chlorurus.*) None of them are very musical or otherwise important.

The Blue Linnet (174. *Cyanospiza amœna*) is a beautiful little species, the male light blue, red, black and white; the female flax-brown. It is a common summer visitor, quite musical, and often kept in cages. It is the western representative of the Eastern Indigo-bird.

The Blue Grosbeak (175. *Guiraca cœrulea*) is twice as large as the last, the male entirely rich deep blue, and a common summer resident in the interior, where they are sometimes kept in cages on account of their beauty and song.

The Black-headed Grosbeak (176. *Guiraca melanocephala*) is a handsome bird, varied with black, brown and yellow, abundant near the coast, and oftener kept in cages than the last, its song being a very loud and clear whistle.

The Evening Grosbeak (177. *Hesperiphona vespertina*) is a very beautiful species, yellow, white and black, inhabiting chiefly the high mountains and tops of lofty trees. Its name is derived from its habit of singing very melodiously in the evening and at night, though from its retiring habits it has not yet been made a cage bird to our knowledge.

The Pine Grosbeak (178. *Pinicola Canadensis*) is a species of a splendid purple when mature, inhabiting lofty pine forests near the summits of the mountains, and northward, occasionally visiting the Eastern States in winter. It has been kept in cages and found to be a fine singer.

The Red Linnets, or Purple Finches, are smaller species common in various districts of this State, the first chiefly in the mountains, the second on the eastern slope of the Sierras, the third in the valleys. They are all good singers, and often kept in cages, the last especially; where, however, the fine purple-red of the males frequently changes to yellow. (179. *Carpodacus Californicus;* 180. *C. Cassinii;* 181. *C. frontalis.*)

The American Crossbill (182. *Curvirostra Americana*) is a curious bird also found eastward, in which the ends of the mandibles cross each other as if deformed, though this is intended to assist them in twisting off the scales of the cones to get at the seeds. They frequent the higher pine forests in large flocks, and have considerable melody of song.

The Yellow-birds, or Thistle-birds, are pretty little species, the first of which is also common in the East, and frequently caged, having nearly the musical powers of the Canary. The other two are smaller, the yellow darker and varied with black or gray. Their songs are similar, but weaker. All these frequent the open districts of this State in large flocks, though the first is most common northward. (183. *Chrysomitris tristis;* 184. *C. psaltria;* 185. *C. Lawrencii.*) Another plainer species lives entirely on seeds of alder, etc., chiefly northward. (186. *C. pinus.*)

The plainer colored Sparrows attract little attention, and are usually confounded by observers, some indeed requiring close comparison to be distinguished by naturalists, but many have sweet songs and interesting biographies, like the equally plain flycatchers and warblers. Some need particular mention.

The Lark Finch (187. *Chondestes grammaca*) is an abundant species in the colder months, and in spring the males sing delightfully. The most peculiar marks they have, are three brown stripes on the head.

The Gold-crowned Sparrow (188. *Zonotrichia coronata*) has a large spot of yellow on top of the head. It is also a good singer in spring.

The White-crowned Sparrow (189. *Zonotrichia Gambelli*) is much more abundant, and may be recognized by three broad white stripes on its head. It has a rather plaintive but very sweet song, and is found in all parts of the State.

The Song Sparrows we have of four or five species, all of plain brown colors with spotted breasts. They are sweet singers, and very domestic, never wandering far from the place of their birth in the garden or thicket. (190. *Melospiza rufina;* 191. *M. Hermanni;* 192. *M. Gouldii;* 193. *M. fallax;* 194. *M. Lincolnii*). The last named, however, is less musical and is migratory.

The other species must be enumerated without further notice, as they are not of special interest, or little is known of their habits. Some of these, however, will be found fully detailed in works on our birds. (195. *Passerculus Sandwichensis;* 196. *P. anthinus;* 197. *P. alaudinus;* 198. *P. rostratus;* 199. *Poœcetes gramineus;* 200. *Ammodromus Samuelis;* 201. *Coturniculus passerinus;* 202. *Junco Oregonus;* 203. *Poospiza bilineata;* 204. *P. Belli;* 205. *Spizella socialis;* 206. *S. Breweri;* 207. *Peucœa ruficeps;* 208. *Passerella Townsendii;* 207. *P. megarhynchus*)

### ORDER PULLASTRÆ—PIGEONS, ETC.

The only species we have of this order are Pigeons and Doves, but the Guans, Curassows, and the extinct Dodo belong to it, while others are found in the tropics.

The Band-tailed Pigeon (210. *Columba fasciata*) is a larger species than the common domestic kind, but similar in form, and of a slaty gray color with a purplish breast. It is abundant in the wooded parts of California, and affords good sport as well as excellent food. It is not found on the eastern side of the continent.

The Carolina Dove, better known here as the Turtle-dove (211. *Zenaidura Carolinensis*) is a smaller species, with a long pointed tail, common in all the United States, and often shot for its delicately flavored meat.

The Ground Dove (212. *Chamæpelia passerina*) is a very small and pretty kind, not larger than a sparrow, found in the southern Atlantic States, Mexico, and in this State, in the Colorado valley.

### ORDER RASORES—SCRATCHING BIRDS.

These birds, represented by the domestic fowls, are well known as very useful to mankind. We have eight species in this State, known as grouse and quails, or sometimes partridges.

The Blue Grouse (213. *Tetrao obscurus*) is a large species, equal to the largest domestic hen, of a slaty blue color when mature, the young mottled. They are found in the coast mountains north of San Francisco bay, and in the Sierra Nevada, coming down lower and being more common as we go north. Living usually in thick forests, they are difficult to kill, but often furnish good sport and good eating. Many are brought to market in winter.

The Sage-fowl (214. *Centrocercus urophasianus*) is a fine species, the male as large as a hen turkey, with long pointed tail, and plumage beautifully varied with gray, brown, black, and white. They are found only in the dry regions east of the Sierra Nevada, and are brought to the markets of Virginia City, etc. They are splendid game-birds, and when properly prepared, excellent eating.

The Sharp-tailed Grouse, or Prairie-Hen, (215. *Pediocœtes Columbianus*), is a species the size of the common hen, of a yellowish brown mottled color, its tail short and sharp-pointed. It is found in this State, only in the northeastern part, but abounds from thence east to the prairies of Illinois, where it is often confounded with the Pinnated Grouse. Keeping in much larger flocks than the Sage Fowl, and frequenting open meadows, grain fields, etc., it is an excellent game-bird, and very superior for the table. Attempts are being made to introduce it west of the Sierra Nevada.

The Ruffed Grouse, often called Pheasant and Partridge, (216. *Bonasa Sabinii*), is a beautiful species, very similar to that so called in the East, with a similar ruff of black feathers on the neck, and a band on the tail, but much darker brown. It is found in this State only towards the line of Oregon, living in the woods, and is considered a fine game-bird in every sense.

The Mountain Quail (217. *Oreortyx pictus*) is one of the most beautiful of our birds, ashy gray, the sides striped with reddish chestnut, with patches of the same on throat and breast, and a crest of long, narrow feathers turned *backwards* on top of the head. It inhabits the higher parts of the mountains, chiefly in the northern half of the State, and is a favorite game-bird where it is found.

The California or Valley Quail (218. *Lophortyx Californica*) is somewhat similar in plumage, but has the forehead yellow, throat black, the crest shorter and turned *forward* at the ends of the feathers. It is the common species in all the lower region west of the Sierra Nevada, and much prized both by the sportsman and epicure.

Gambel's Quail (219. *Lophortyx Gambelli*) is a very similar species, found on the east side of the Sierra Nevada, and in Arizona.

All these are of about the same size, (the first a little the largest,) and in this fact only, resemble the Quail of the Atlantic States or the Partridge of Europe, but otherwise all are quite distinct birds, only confounded in popular language on account of the want of distinctive names.

### Order Grallatores—Waders.

These birds form a natural link between the land and water birds, some of them being usually considered as of the latter group, on account of their partially webbed feet and power of swimming. Nearly all these birds are eaten, though some of them are rather fishy, and others have a marshy flavor.

The Brown or Sand-hill Crane (220. *Grus Canadensis*) is abundant in the colder months in our valleys, and a few breed in the mountains. When young, and especially if caught alive and fattened, they are nearly equal to the turkey for the table. Being easily tamed when raised from the nest, they are often kept as pets and allowed to run at large. Their food consists in part of roots and plants, unlike that of the similar Herons, which eat fish chiefly. Their height, when standing, is nearly five feet.

The Great Blue Heron (221. *Ardea herodias*) is common about every stream or body of water in this State, and at all seasons where unmolested. Being very shy they are not often killed, and are usually fishy, though young ones are pretty good eating. They are nearly as tall as the Brown Crane, but lighter.

The Great White Heron (222. *Herodias Egretta*) is nearly as large as the Blue Heron, and snowy white, with black bill. It is common but very shy, and killed only for its fine plumes. It is about three and a half feet high when standing.

The Little White Heron (223. *Garzetta candidissima*) is about a third of the size of the last, or two feet high. They are more gregarious than the large kinds, and even more shy. They also have beautiful plumes, but are of no value for any other reason.

The Night-Heron, or Qua-bird (*Nyctiardea Gardeni*), is a beautiful bird, dark green above, whitish beneath, wings and tail grayish blue, with three long narrow feathers hanging from the back of the head. The young is grayish, mottled brown, and without the plumes. It is common in summer, but usually concealed during the day in thick woods or shady ravines, going out about sunset to fish in shallow fresh waters. Though rather fishy, they are often eaten. Their height, when standing, is a little over two feet.

The American Bittern (225. *Botaurus lentiginosus*) is a mottled brown and yellowish bird, frequenting grassy marshes, and also quite nocturnal in habits, though often startled from its retreat in the daytime. It is considered pretty good eating, and often called Marsh Hen, being about the size of a thin fowl in the body, but nearly two feet in height.

The Green Heron, or Mud-poke (226. *Butorides virescens*), is a handsomely variegated green bird, standing a foot and a half high, frequenting chiefly the banks of running streams. It is rarely eaten.

The Least Heron, or Bittern (227. *Ardetta exilis*), is also varied with dark green, chestnut, gray, etc., and is little over a foot high, very slender, weighing only four or five ounces. They frequent chiefly the grassy borders of ponds or rivulets.

The Wood-Ibis (228. *Tantalus loculator*) is called "Colorado Turkey" in this State, and "Gannet" in Florida, though very unlike either of these birds, a striking instance of the uncertainty of popular names. It is a white bird with black wings, nearly five feet high, and weighs over ten pounds. They are said to be very tough and oily, though eaten when skinned, in the absence of better food. In this State they are confined to the lower Colorado valley, but inhabit also the Southern Atlantic States, as do all the preceding waders.

The Glossy Ibis (229. *Ibis Ordii*) is a beautiful bird, reddish chocolate, with green and purple wings, closely resembling the Egyptian sacred Ibis. The young has the head and neck grayish. It is not rare in the extensive marshes of this State in summer, and often shot and sold by the name of "Black Curlew," being pretty good eating. It is about two feet in height, and as heavy as a hen.

Of the Plover family there are several species, three of which are from the size of a dove to that of a pigeon, and therefore considered game, though the others are sometimes shot and eaten. All are usually fat and very good eating.

The Swiss, or Black-bellied Plover, (230. *Squatarola Helvetica*), is the largest, and frequents the sea-shore in small flocks in winter. It is not so good as those found inland. It is also found on nearly all sea-coasts.

The Golden Plover (231. *Charadrius Virginicus*) is nearly as large, and beautifully spotted with small round yellow dots, which are wanting in winter, the whole bird being then of a light gray. They chiefly frequent grassy plains in large flocks, and are also common in the Eastern States.

The Mountain Plover (232. *Ægialitis montanus*) is a smaller, brownish-gray bird, found only west of the Mississippi, frequenting the dry plains in summer, in pairs or broods, and in winter coming west of the Sierra Nevada, especially southward, where they form large flocks. As game, they are very similar to the last, and usually very fat.

The Killdeer (233. *Ægialitis vociferus*) is a pretty bird, frequenting brook-sides, very unsuspicious, and often noisy, its name being derived from its common note. It is scarcely a game bird. There are two other little species found along the sea shore, the first in winter, the second constantly. They are not larger than blackbirds, and not often shot unless in flocks of sand-pipers. The first is called Ring Plover, the second Snowy Plover, and both are prettily marked about the head. (234. *Ægialitis semipalmatus*, and 235. *Æ. nivosa*). The Surf-bird (236. *Aphriza virgata*) is a rare and little known species, found on rocky coasts among the foam of the waves in winter. It is more properly a bird of the Sandwich Islands and South America.

The Oyster-Catchers are rather larger than pigeons, and our two species are black with red bills, the first with red feet, the second white beneath. They are not very common, but found along rocky or sandy shores, where they feed on shell-fish, the bill being flattened like an oyster-knife for the purpose of opening the shells. (237.

*Hæmatopus niger,* and 238. *H. palliatus*). The last is also found on the Atlantic coast.

The Turnstones are similar, but not half as large, and in summer plumage much varied in colors, but here usually found only black and white. They chiefly frequent the rocky sea coasts, and are good eating, though rarely killed. (239. *Strepsilas interpres,* and 240. *S. melanocephalus*). The first is also common eastward, and on the old continent.

The Avocet (241. *Recurvirostra Americana*) is nearly all white, with black patches on the back. It is sometimes called White Curlew, but its bill turns up instead of downwards. It frequents shallow pools away from the coast, and is often killed in large numbers, being nearly as heavy as a quail, though slender, and over a foot in height.

The Black-necked Stilt (242. *Himantopus nigricollis*) is nearly as tall as the last, but remarkably slender in all parts, its body not weighing half as much. It is rather rare and solitary in habits, frequenting the borders of clear water, chiefly inland.

The Snipe family may be distinguished from the preceding long-billed and small waders by being of a mottled brown, black, and yellowish pattern of colors. The American Snipe (243. *Gallinago Wilsonii*) is usually called "English," but differs from any species of the old continent. It frequents the soft marshes and fields in great numbers in the colder months, and affords excellent sport to the gunner, besides being the best small game-bird for the table. They weigh about three ounces.

The Long-billed and Robin Snipes do not differ much in plumage, but the first is the largest, and more partial to fresh water ponds, while the latter frequents salt marshes, often in large flocks. They are both shot for market, though inferior to the preceding as food. (244. *Macroramphus scolopaceus;* and, 245. *S. griseus.*)

There are several little species of Sandpipers, from the size of the preceding down to that of a Sparrow, which much resemble each other while visiting us in the colder months, and are usually confounded by gunners as various ages of one species, though differing much both in anatomical characters and in summer plumage. They frequent chiefly the brackish marshes near the seashore, and are shot in large numbers, from ten to fifty being killed at one shot, so densely do they fly, several species usually together. The first and largest is distinguished as Jack-Snipe, the others often called Sand-Snipe. The last has only three toes on each foot, like the Plovers. (246. *Actodromas maculata;* 247. *A. minutilla;* 248. *Pelidna Americana;* 249. *Ereunetes occidentalis;* 250.

*Calidris arenaria.*) All of this family are also found in the Atlantic States, and some also inland, especially Nos. 243, 244, 246.

The Willet (250. *Symphemia semipalmata*) is a large bird, about equal in size to a Pigeon, gray, with white and black wings. It frequents bays, and is brought to market, although inferior to many other birds as food. It is found in all parts of America.

The Yellow-legs (252. *Gambetta melanoleuca*) is nearly as large, and thickly spotted with white. It is more solitary, but found in all marshy places, where its vigilant whistle often alarms other birds and brings on it the gunner's vengeance, though it is a poor bird for the table. It is also called Tell-tale, Tattler, and Stone-Snipe.

We have also three smaller species, ranging from the size of a Jay to that of a Sparrow, and usually found solitary, or in small families. The first frequents only the rocky shores and islands of the Pacific. The other two are found about fresh waters throughout North America. (253. *Heteroscelus brevipes;* 254. *Rhyacophilus solitarius;* 255. *Tringoides macularius.*)

The Buff-breasted Snipe, or "Grass Plover," (256. *Tryngites rufescens*), is found throughout America and Europe, chiefly in grassy, and often dry places. It is like a short-billed Snipe, as large as a Dove, and though solitary, a good game-bird.

The Godwit, (257. *Limosa fedoa*) is often confounded with the Curlews, which it resembles in colors, but has the bill turned upwards. It is of the size of a Pigeon, and frequents chiefly the seashore of the whole western continent. It is eighteen or twenty inches long, (the bill four to five), and is a good game-bird.

The Long-billed Curlew (258. *Numenius longirostris*) is the largest of the Snipe family, measuring eighteen inches without the bill, which is seven to nine inches long, and sometimes weighing nearly two pounds. They frequent the mud-flats, and also the grassy plains of the interior, feeding there on grasshoppers, and are considered among our best game-birds. This species is found throughout the United States.

A smaller Curlew (259. *Numenius Hudsonicus*) is found occasionally, migrating along our coast in spring and fall, as they do along the eastern coast. They are a third smaller, weighing about one pound.

The Phalaropes are little snipe-like birds, with lobed webs along the margins of the toes, and able to swim actively, as they do, both along the sea-shore in little lagoons, or far out at sea, where their presence often misleads the mariner to suppose that land is near. They visit us only in winter, though one species is supposed to spend the summer about our mountain lakes. (260. *Phalaropus hyperboreus;* 261. *P. fulicarius;* 261. *P. Wilsonii?*)

The American Gallinule (263. *Gallinula galeata*) is a marsh bird, allied to the Rails, about fourteen inches long, and olive-colored above; head, neck and body gray; bill and eye red; legs greenish yellow. They are not so common here as in the southern Atlantic States. Like the following larger Rails, they are often called Marsh-hens.

The Greater, or King-Rail, (264. *Rallus elegans*), is common in the fresh or brackish marshes of this State, as well as across this continent. They are killed for market in large numbers, and considered good food, although inferior to the smaller species. They measure eighteen or nineteen inches in length, and weigh one to one and a half pounds.

The Clapper-Rail, (265. *Rallus crepitans*), is a very similar, but smaller species, frequenting only the salt marshes. It is fourteen or fifteen inches long, and weighs eight or ten ounces.

The Virginia Rail (266. *Rallus Virginianus*) is like a miniature of the first, and is also found throughout the United States in similar places. They measure nine to ten and a half inches, and are very good eating, but not anywhere numerous.

The Carolina Rail, or Sora (267. *Porzana Carolina*), is smaller than the last, and with a black stripe from the crown of the head down the throat to the breast (wanting in the female), back brown, grayish beneath. In the Atlantic States it is a favorite game-bird, but has not yet become so here, where so many larger birds are common.

The Yellow Rail (268. *Porzana Noveboracensis*) still smaller, is also found across the continent, but more rarely obtained, and not of much interest.

The Black, or Jamaica Rail (269. *Porzana Jamaicensis*) is a curious species, little larger than a sparrow, beautifully dotted with white. It rarely flies, but creeps through the long marsh-grasses, and is rarely obtained except when driven out by high tides or caught by a dog.

The American Coot (270. *Fulica Americana*), often called Mud-hen, is a slaty-blue, duck-like bird, very numerous throughout the United States, but not much eaten, though chiefly a vegetable eater. They are, therefore, very tame and unsuspicious, frequenting every pond and marsh at times. They weigh about a pound, have shorter necks and legs than the Rails, and are remarkable for having broad lobes, like webs, along the edges of the toes, enabling them to swim as well as run, thus forming a link with the Water Birds.

## WATER BIRDS.

### Order Natatores—Swimmers.

Of these we have nearly ninety species, most of them found only on or near the salt waters. They are all connected together by the fact of being web-footed, although this does not form a natural division any more than it would among Mammals.

The Swans are of two species, the first a third larger than the other, but are nearly alike in their snowy plumage. A few are killed every winter as far south as San Francisco. They are not considered equal to the geese for the table. (271. *Cygnus buccinator;* 272. *C. Americanus.*) The latter only is found on the Atlantic side.

The Snow Geese are also of two species, differing chiefly in size, and are both white with black quills. The first and larger kind is numerous in the colder months, both along the coast and inland, but they are not considered so good for the table as the brant. (273. *Anser hyperboreus;* 274. *A. albatus.*)

The Black-bellied Goose (275. *Anser Gambellii*) is a gray species with reddish bill and orange feet. It is less aquatic than the rest, feeding more on grass, and probably the best of all for the table. They weigh four to five pounds, and are more common here than near the Atlantic.

The Canada Goose, or Brant (276. *Bernicla Canadensis*) is a large species, often tamed, and well known in captivity by the white patch on its cheeks. It is commoner toward the north and eastward, but rarely seen on salt water, and is the largest of our species, often weighing seven pounds. Some are believed to nest about our mountain lakes. Hutchins' Brant (277. *Bernicla Hutchinsii*) is like a miniature of the last, having even the white patch on each side of the head, and is much more common here, while the case is reversed on the Atlantic coast. It is of about the same size and weight as the *Anser Gambelii.* The Ring-necked Brant (275. *Bernicla leucopareia*) is a very similar species, with a white ring around the base of its neck, and probably a visitor here from Asia, being rare.

The Black Brant (279. *Bernicla nigricans*) is entirely black, except the rump, and a narrow ring round the middle of the neck. It is entirely a salt-water species while here, living on grasses, etc., in the bays, not often killed, and very rare along the Atlantic coast. It is much smaller than the last.

The Tree-Goose, (280. *Dendrocygna fulva*), unlike most of the others, is a southern species, visiting us in summer, and breeding in small numbers on the interior marshes. They resemble long-legged brown ducks, and are of the size of the Mallard.

The Mallard (281. *Anas boschas*) is numerous at all seasons, and well known as the origin of the domestic duck, common on both continents.

The Pintail (282. *Dafila acuta*) is abundant in winter on the fresh waters and bays, and is one of the best species for eating. This also is common around the northern hemisphere.

The Green-winged Teal (283. *Nettion Carolinensis*) is abundant in the colder months throughout North America, and though small, is considered as good eating as any. It scarcely differs from the European species. The Cinnamon Teal (284. *Querquedula cyanoptera*) is a beautiful species, the male mahogany red, with blue wings. It is common in this State, and in South America, but only a straggler on the eastern slope.

The Shoveler (285. *Spatula clypeata*) is a common winter species throughout the northern hemisphere, and some breed within our limits. They are about half the weight of the Mallard. The Gadwall (286. *Chaulelesmus streperus*) is another middle sized duck found throughout the Northern hemisphere. Like the last, they are chiefly fresh water species and good food. The American Widgeon (287. *Mareca Americana*) is of similar size, with a white patch on the head, from which it is often called Baldpate. It is chiefly a North American species. The European Widgeon (288. *Mareca Penelope*) is not uncommon here, but merely as a straggler. It is similar in size, but has a brownish head.

The Wood, or Summer Duck (289. *Aix sponsa*), is a beautiful species, common in summer throughout the United States, living chiefly in woods and building in hollow trees. The male's plumage is too varied for description here, but it is notable for having a long crest, and is often seen stuffed in museums.

Our other ducks are more fond of salt water bays, although most of them are also found inland. They are considered generally inferior for the table, unless we except the famous Canvass-back. The three first are common to the whole Northern hemisphere, the rest only occasionally found in the Old World, though others very like some of them occur there. The three first and four last are exclusively marine and not much eaten.

The Harlequin Duck (290. *Histrionicus torquatus*) is so called from the bizarre pattern of its beautiful plumage. It visits our northern coast in winter, but is rare. The Old Wife, South Southerly or Long-tail (291. *Harelda glacialis*) is a duck of middle size, plain plumage, and gets its second name from its peculiar cry. It visits us with the last. The Big Black Head (292. *Fulix marila*), and Little Black Head (293. *Fulix affinis*), also called Scaup Ducks and Broad-bills (as is the Shoveller), are nearly alike in plumage, and found plentifully in muddy creeks in winter. The last is peculiar to America. The Ringneck (294. *Fulix collaris*) is more of an inland species, and like the last, rather fishy.

The Red-head and Canvass-back Ducks are so nearly alike in plumage, that the former is often sold for the latter, but may be distinguished by its light blue bill, lower part of neck more widely banded with black, smaller size, etc. There is, however, little difference in their flavor after all. The female of the first is entirely brown, of the last whitish, waved with black; head, neck and breast brownish. (295. *Aythya Americana;* 296. *A. valisneriana.* The Golden-eye (297. *Bucephala Americana*) is a handsome species, and pretty good eating. The Buffel-head, Butter Duck, or Spirit Duck (298. *Bucephala albeola*), is a common little species, found with the preceding everywhere in winter, very handsome, and usually very fat. The Ruddy Duck, or Dun Bird (299. *Erismatura rubida*) is reddish-brown, top of head black, cheeks and chin white. The female is blackish-brown, dotted with white. It is a winter duck, most common in fresh water, and considered fair eating.

The four next species are usually confounded under the names of Surf-Ducks, Velvet Ducks, Scoters, and Coots. They never go inland, live on fish, and are scarcely eatable. Their plumage is black, with white patches on the head or wings, or variously colored bills, which distinguish them. The females are mostly sooty brown. (300. *Pelionetta perspicillata;* 301. *P. Trowbridgii;* 302. *Melanetta velvetina;* 303. *Oidemia Americana.*)

The Shell-drakes, Saw-bills, Goosanders, or Mergansers, differ from the ducks in having narrow bills with sharp teeth along the edge. They live only on fish, and are scarcely ever eaten. They are, however, very beautiful in plumage. The first two have green heads, black and white backs, and salmon or buff breasts; the females are gray with red crested heads. The third species is called Hooded, from expanded black and white feathers on the head; in the female the black is replaced by brown. They are partial to swift running streams, and the two last are found around the Northern hemisphere. (304. *Mergus Americanus;* 305. *M. serrator;* 306. *Lophodytes cucullatus.*)

The remaining water-birds are exclusively fish eaters and scarcely ever eaten, unless when young, though the eggs of some are much used. They must be disposed of more briefly than the ducks.

The Pelicans are of two species, the white and gray, the first chiefly found on fresh water, the last on salt, and both abound here in the colder months, as well as near the Atlantic. They are curious and interesting birds, but uneatable. (307. *Pelecanus erythrorhynchus;* 308. *P. fuscus*). The Frigate Pelican, or Man-of-War-Bird, (309. *Tachypetes aquilus*) is occasionally found along the southern half of our coast, as well as in all tropical regions.

Our Cormorants are of three or four species. The first is largest, and found throughout the United States on rivers and sea-shores at all seasons. The others are confined to the rocky coast and islands of the eastern Pacific ocean. They are black, with more or less beautiful tints of green and purple, white patches, etc. (310. *Graculus dilophus*; 311. *G. penicillatus*; *G. violaceus?* 312. *G. Bairdii*).

The Short-tailed Albatross (313. *Diomedea brachyura*) is white with black quills, the young for some years more or less sooty-black, and is one of our largest birds. It is confined to the North Pacific. Length, 3 feet; extent, 98 inches.

The Gigantic Fulmar (314. *Ossifraga gigantea*) is about the same size, brownish and white, and wanders far at sea over the Pacific Ocean, feeding on dead whale meat, or other similar food, and rarely approaching the land.

Two smaller Fulmars are found near the coast, and live by attacking gulls in the air, obliging them to disgorge, and catching the half digested food as it falls. They are the vultures of the sea. (315. *Fulmarus pacificus*, and 316. *F. tenuirostris*). Their plumage is so much like that of the gulls that they easily approach them unnoticed, but their bills are hooked. The Shearwaters are very similar, but obtain their food by skimming off small fish, floating oil, etc., from the waves, and keep off several miles from the coast. They are plain gray, brown, or black and white birds, and should be called puffins, though this name is usually applied to the sea-parrots. (317. *Priofinus cinereus*; 318. *Puffinus creatopus;* 319. *P. fuliginosus*).

The Petrels, or "Mother Carey's chickens," are occasionally seen along the southern half of our coast, and the first named also northward. This is a gray species; the second black; the third black with a white rump, and the only one found in both oceans. They feed like the last, and follow ships to pick up what is thrown over, as do the Albatross and Puffins at times. (320. *Oceanodroma furcata;* 321. *Cymochorea homochroa;* 322. *Oceanites oceanica.*)

The Gulls are numerous here, both on fresh and salt waters, and several of them are very similar in plumage, usually of some shade of blue above, the rest white, but, when young, mottled with brown. Each, however, has peculiarities in habits, size, etc., and only the second spends the summer on our coast, though another breeds on the islands of Mono Lake. They eat everything of an animal nature they can swallow, and follow ships. The first is entirely white, and is a rare visitor from the Arctic regions. (323. *Larus Hutchinsii;* 324. *L. occidentalis;* 325. *L. glaucescens;* 326. *L. Smithsonianus;* 327. *L. Delawarensis;* 328. *L. Californicus;* 329. *L. brachyrhynchus.*)

Heerman's Gull (330. *Blasipus Heermani*) is a small species, dark blue, with white head and red bill, which is often seen accompanying the Gray Pelicans, and catching the small fish they drop from their pouches after a successful dive. Kotzebue's Gull (331. *Rissa Kotzebuei*) is a pretty little species, similar to the group first named. The Hooded Gull (332. *Chroicocephalus Philadelphia*) is common throughout the United States in summer; of rather small size, gregarious, and a good fisher.

The Terns, or Sea-Swallows, are much like Gulls, with slender, sharp bills, usually red or black; bluish above, white beneath. They are better divers, and live only on fish. Some are tinged on the breast with rose or salmon color. (333. *Thalasseus regius;* 334. *T. elegans;* 335. *Sterna Forsteri;* 336. *S. Pikei.*) The first and third are Eastern also.

The little Black Tern (337. *Hydrochelidon fissipes*) is not always black, but in winter the body and wings are lead-gray, while the young are white, brownish or black above. They frequent chiefly clear inland waters, and have much the appearance of large swallows, feeding on fish, and at times on insects also, as do some of the larger species, when away from the coast.

Three species of this family, of peculiar forms and habits, are said to visit this coast, but have not been recently seen. The first is Arctic, the other two tropical. (*Buphagus skua; Creagrus furcatus; Haliplana fuliginosa.*) The first, called Yager and Skua, is a sort of marine Eagle; the second is little known, but has a long forked tail; the third is called Sooty Tern, or Noddy, and is found in both tropical oceans.

Our Loons are of three species, the two first found in all the northern hemisphere; the third peculiar to Northern America. They are large and beautifully colored birds, when mature, but usually seen in a plain brownish young plumage. Their most common names are Great

Northern, Black-throated, and Red-throated Divers, and they frequent both fresh and salt waters. (338. *Colymbus torquatus;* 339. *C. septentrionalis;* 340. *C. Pacificus.*)

The Grebes or Dobchicks resemble Loons, but have the toes lobed instead of webbed. All the species yet found in this State are peculiar to the west coast of America, and, while with us, are grayish black above, and white beneath—though probably obtaining finer colored feathers in their northern breeding places. They vary from the size of a duck to that of a dove, have long slender necks and bills, and dive so quickly as often to escape being shot. (341. *Æchmophorus occidentalis;* 342. *Æ. Clarkii;* 343. *Podiceps Cooperi;* 344. *P. Californicus.*)

The Thick-billed Dobchick, or Dipper, (345. *Podilymbus podiceps*), is common, chiefly on the fresh waters of all North America, and remains with us in summer, building a nest floating on the water, and attached to neighboring plants. It has many curious characteristics.

The Tufted Auk, or Sea Parrot (346. *Mormon cirrhata*) is often called Puffin, (see No. 318). It is an extraordinary bird, of the size of the common green parrot, and much the same form—its bill flattened laterally like a knife, but in profile not unlike the parrot's, being suited for crushing crabs and shells for which it dives. Its color is black and white, with a long yellowish tuft of hair-like feathers, on each side of the head. It is common on the Farallone islands and others in the North Pacific, where it lays one egg each year in a burrow scratched among the rocks. Nearly all the following species also hatch but one young one annually.

Two smaller black and white Auks, with smaller, more pointed bills, and similar tufts on the head, are found along the sea-coast, chiefly in winter. (347. *Cerorhina monocerata;* 348. *C. Suckleyi*). They have a curious knob on the bill, above the nostrils. Like all our auks, they fly well, but excel most in swimming and diving. A still smaller kind of the North Pacific only, is remarkable for singing rather musically, when at night they visit their burrows on lonely islands during early summer. (349. *Ptychoramphus Aleuticus*).

The Pacific Sea Pigeon (350. *Uria Columba*) is as large as the land-pigeon, black with white on the wings, and red feet. It lays and sits on three eggs at a time.

The Californian Murre (351. *Catarractes Californicus*) is as large as a small duck, head and back brown, beneath white, bill sharp-pointed. They swarm about the Farallones and more northern islands, occasionally visiting open bays to fish. Their eggs form quite an article of traffic in June, when they are brought in boat-loads to San Francisco, and sold at a lower price than hens' eggs for cooking, though when hard-boiled they are pretty good to eat. They are usually of the size of a goose egg, but vary down to less than a quarter of that size, and unlike nearly all other birds' eggs, there are scarcely two alike in color, being variously streaked and spotted with black, brown, green, blue, or olive, on a ground of white, blue, green, brownish or neutral tints. Each bird lays and sits on but one egg at a time, but they repeat the attempt to raise young several times after being robbed.

Two other little Auks complete our list of birds of this coast. The first is of the size of a pigeon, and visits us from the north in winter. The other is a third smaller, and found as yet only on our southern group of islands and at Cape St. Lucas, being the most southern of the Auk tribe north of the Equator. Both are peculiar to the North Pacific, and both colored black and white, though differently. They live in the open sea, and dive for small fish. (352. *Brachyramphus marmoratus;* 353. *B. hypoleucus*).

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## REPTILES.

Of these animals (which we may consider as including the Batrachian, or scaleless, as well as the true reptiles,) there are eighty-five species in California. Though generally considered uninteresting, and repulsive to the majority of people, some are useful as food, and nearly all serviceable on account of the insects, mice and other vermin they destroy, while none but the Rattlesnakes in this State are actually venomous. None are identical with Eastern kinds.

### ORDER TESTUDINATA—TORTOISES.

Of these we have few species, compared with States east of the Mississippi, on account of the much drier character of our climate, not furnishing such extensive and permanent bodies of water as most of them require.

Agassiz's Tortoise (1. *Xerobates Agassizii*) is found only in the southeast quarter of California, which is both the driest and warmest. They grow a foot in length, and live wholly on vegetable food, closely resembling the Tortoise called Gopher, (i. e. burrower), in the Gulf States. They are like that and most other species, eatable, but not very well flavored.

The Western Terrapin (2. *Actinemys marmorata*) is abundant in all the fresh waters except perhaps, the Colorado river. It is black, usually mottled densely with yellow dots regularly arranged. They are almost constantly for sale in the markets of San Francisco, and make pretty good soups, though much inferior to the Sea-turtles. They grow eight or nine inches in length.

Another Turtle (3. *Platythyra flavescens*) is found in the lower Colorado, but little is known concerning it, except that it is found also eastward to the Gulf of Mexico. Agassiz's great work gives full descriptions and figures of the last two. (Contributions to the Nat. Hist. of the United States, vols. I and II.)

Great numbers of Sea-turtles are brought here from Mexico, but are never captured within our limits.

### ORDER SAURIA—LIZARDS.

In this group of animals, for which our warm dry climate is particularly adapted, California excels all the other States put together. Many of them are remarkable for curious forms and beautiful colors; but they are generally avoided, or destroyed by inconsiderate people, from prejudice or ignorance of their harmless and useful nature.* Nearly all live entirely on insects, but one or more of the largest found in the southeastern quarter eat vegetable food. Many of them are eaten by the Indians, and if we could overcome old prejudices, might be found as good as the Iguanas of the tropics, which are considered by people of all colors excellent food. None of our species are poisonous or venomous, as far as is known, though some have that reputation merely on account of their ugly appearance. (By the help of the scientific names, figures and descriptions of most of them may be found in the Pacific R. R. Reports, U. S. and Mex. Boundary Reports, etc.)

We have no Alligators on this coast.

Various species, called "Fence Lizard," are common throughout most of the State. All of the genus have, in the male, a brilliant blue patch on each side, somewhat beneath, and grow from six to ten inches long. (1. *Sceloporus occidentalis;* 2. *S. graciosus*, southward and eastward ; 3. *S. biseriatus*, southward and eastward ; 4. *S. magister*, Colorado valley—the largest ; 5. *S. Clarkii*, Colorado valley ; 6. *S. longipes*, east of the Sierra Nevada.)

The "Fat Toad Lizard," (7. *Euphryne obesa*), is a large heavy blackish species, nearly a foot long, found near the Mexican boundary, and probably vegetivorous. A more slender species, (8. *Crotaphytus fasciatus*), banded black and grayish, over a foot long, is found chiefly east of the Sierra Nevada.

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* They are sometimes called "Scorpions," but are quite distinct from those insects.

The next is a pretty little species discovered by Capt. Stansbury in his Salt Lake Exploration, 1852, but common everywhere in the southern part of this State; (9. *Uta Stansburiana.*) All the following species are more or less similar and not over four or five inches long: 10. *U. ornata,* found with the preceding; 11. *U. graciosa,* chiefly southeastward; 12. *U. symmetrica,* chiefly southeastward; 13. *U. Schottii,* along the Mexican line.

The "Thirsty Lizard," (14. *Dipsosaurus dorsalis*), is a rather heavy built lizard, a foot long, and vegetivorous, found in the Colorado valley. It is mostly pale gray, and has the back ridged, like the Iguana. Next is a middle sized, very slender and swift lizard, found in the sandy plains of the southeastern quarters, (15. *Callisaurus ventralis*), the name of which means "beautiful lizard."

The "Horned Toad," (16. *Tapaya coronata*), common west of the Sierra Nevada, is named from the broad, flat shape of its body, with short tail, but is far removed from the toads in everything else. The name "*Tapaya*" is Mexican. Its "horns," or spines about the head, though by many considered poisonous, are harmless. The "Horned Toad" of the northeast parts of California, and thence eastward to Nebraska, (17. *Tapaya Douglasii,*) is much smaller, being about four inches long—the preceding, six.

A "Horned Toad" of more slender form is found in the southeastern regions, and growing seven or eight inches long; (18. *Phrynosoma regale*)—literal meaning of the name, "royal toad-body" (lizard). A "Horned Toad," also found in the southeastern regions; (19. *Doliosaurus platyrhinus*)—literal meaning of the name, the "broad-nosed barrel lizard." Another "Horned Toad," is without any ear-openings, but not deaf, as, like all the species, it is quite vigilant, active, and not easily caught in warm weather; (20. *Anota McCallii*). The name means earless, and General McCall first collected it.

A small lizard of the desert is named from Fort Yuma, and from its spotted color; (21. *Uma notata*). A large striped lizard, chiefly found east of the Sierras, is a foot long, and named Tiger Armor-bearer, from its color and armor-like scales; (22. *Cnemidophorus tigris*). A small, but peculiar species, is found as yet only near Fort Tejon, and named after J. Xantus de Vesey, its vigilant discoverer; (23. *Xantusia vigilis*).

A blackish lizard, a foot or more long, with strong, heavy limbs, and large blunt head, its skin knobby instead of scaly, is found along the Mexican boundary. It is the kind reputed poisonous, but is probably not. The name means the "horrid knobby-skinned" lizard; (24.

*Heloderma horridum*). The Many-ribbed Lizard (25. *Gerrhonotus multicarinatus*) is a foot long, but rather slender, though slow, found everywhere west of the Sierras, chiefly in forests. It is beautifully colored, and perfectly harmless. 26. *G. Webbii;* and 27. *G. olivaceus*, are small kinds found near the Mexican Boundary. There is a smooth, very long and swift lizard, found chiefly in the northern part of California and Oregon. It is grayish-brown, somewhat spotted, and named in part from its long tail being like that of the lizard called Skink. The generic name may be of Mexican origin. (27. *Elgaria scincicauda* ; 28. *E. formosa*, is a similar species.) The Variegated Lizard (29. *Stenodactylus variegatus*) is a small species found near the Mexican Boundary. Another rather small kind is found in the northern half of California, also northward and eastward, of which the name means Crowded-toothed, (Lizard), of Skilton. (30. *Plestiodon Skiltonianum.*)

Glass-Snake (31. *Ophisaurus ventralis?*) A species is said to be found east of the Sierra, but is probably undescribed. These animals have the form of a snake, but the anatomy of a lizard, though without feet. When struck, the tail generally breaks off short unlike that of the snakes, and is said to grow out again, though imperfectly. They are quite harmless, and a foot or two long. The generic name means Snake-Lizard.

### ORDER OPHIDIA—SERPENTS.

These animals, so horrifying to most persons, are really useful, as they destroy great numbers of ground-squirrels, gophers, mice and insects. Only the Rattlesnakes are venomous, and are easily distinguished by their rattle. Some persons eat even these with great relish, but we not know that any of the harmless kinds are eaten.

### *Venomous Serpents.*

The "Fierce Rattlesnake," (1. *Crotalus atrox*), is the kind common in the Colorado valley, growing three feet long, and with black rings on the tail. The "Horned Rattlesnake" (2. *C. cerastes*) is a curious species a foot long, with pointed knobs over the eyes, and found only in the southern counties. The "Tiger Rattlesnake" (3. *C. tigris*) is found in the Colorado desert regions, of large size.

The "Oregon Rattlesnake," (4. *C. Lucifer*), lives chiefly in the northern part of California, eastern Oregon, and British Columbia ; is olive and white, and grows two or three feet long. The "Southern Rattlesnake" (5. *C. Hallowelli*) is the common species in the southern counties west of the Sierra, and grows four feet long.

### *Harmless Serpents.*

A pretty species, (6. *Chionactis occipitalis*), banded black and white, two feet long, found in the Colorado valley and southward has no common name. The "Banded Milk-snake" (7. *Lampropeltis Boylii*) is similar in colors, but the bands more equal. It is found everywhere west of the Sierra Nevada, and grows three or four feet long. The "Beautiful Ring-snake" (8. *Diadophis pulchellus*) is about eight inches long, bluish-black above, rich orange-red beneath, with a ring of the same around its neck, and found chiefly in the Coast Range. Two, (9. *D. amabilis;* 10. *D. pallidus?*), are similar species, but differ in colors and localities. Another little species of similar size, but olivaceous color, found in the Coast Range, is named from Leconte, the discoverer, (10. *Contia mitis.*)

The "Coppery Whip-snake" (11. *Drymobius testaceus*) is a very slender species, four feet long or more, coppery-red, varied with black and white, found in the southern counties, and thence eastward to Texas. The "Few-striped Whip-snake" (12. *D. lateralis*) is blackish, with a few pale stripes on the sides, three feet long, and found in the Coast Range chiefly. The "Many-striped Whip-snake" (13. *D. tæniatus*) is pale, with several narrow stripes, of the same size, and found chiefly east of the Sierra Nevada. A middle-sized snake of plain color is found along the Colorado, and named from a Mexican State, and Col. Graham, the discoverer, (14. *Salvadora Grahamii*).

The "Green Racer" (15. *Bascanion vetustus*) is an olive-green snake, yellow beneath, three feet long, and found everywhere west of the Sierra ; climbs trees like the Eastern blacksnakes, to which it is nearest related—harmless, but kills many mice and some small birds.

The "Wandering Garter-snake" (16. *Eutainia vagrans*) is a pale gray dusky-striped species, found nearly everywhere west of the Rocky Mountains, but rare near the coast. The following eight species are also called garter-snakes, and are all about two feet in length, but vary in colors and arrangement of stripes, as well as other characters. The Nos. 20, 21, and 22, are among our prettiest species of snakes. The first five are northern, the others chiefly of the southern half of the State, west of the Sierras. (17. *E. atrata;* 18. *E. leptocephala;* 19. *E. infernalis;* 20. *E. Pickeringii;* 21. *E. concinna;* 22. *E. elegans;* 23. *E. Hammondii;* 24. *E. Couchii*).

The Southern Bull-snake (25. *Pityophis bellona*) is a thick, heavy species, four feet long, found in the Colorado valley, and though large, and colored in diamond-pattern, like the rattlesnakes, is quite harmless, and, like the very similar species following, lives chiefly on mice, gophers, and other burrowing animals, pursuing them under ground. (26. *P. catenifer;* 27. *P. annectens;* 28. *P. vertebralis*). These are found west of the Sierra, and are probably varieties of one species. They are also called Pine Snakes (the generic name).

A curious species is found only near the Colorado Desert, of which the name means Scale-nosed (snake) of Leconte, (28. *Rhinocheilus Lecontii*). One, (29. *Rena humilis*), of which the name may mean Humble Sheep-snake, is also a plain colored, but peculiar small snake, living chiefly under ground, and found with the preceding.

The "Wood Snake" (30. *Charina Bottæ*) is a short, thick, smooth species, with small head and eyes, brown above, yellowish below, found in woods under decayed logs, bark, etc., and comes nearer in structure to the celebrated *Boa Constrictor* than any other United States snake, but is quite harmless, living on insects, and apparently hunts for them mostly at night. It grows only about two feet in length, and is found chiefly in the Coast Range, from Puget Sound to Mexico, whence the generic name probably comes.

### ORDER BATRACHIA—FROGS, ETC.

The Batrachia, or soft-skinned reptiles, include frogs, toads, and salamanders, or newts. Many species of frogs are eaten, when large enough for their hind legs to furnish a choice morsel for epicures, and all are regarded as harmless creatures, with the good reputation of keeping springs clear and pure, probably because they are sensible enough to inhabit such water. The following species have been described from California, chiefly the northern parts, as they do not inhabit the muddy Colorado, and are scarce where the water dries up in summer. (1. *Rana longipes*; 2. *R. Boylii;* 3. *R. Draytonii;* 4. *R. Lecontii*).

One species of Wood-frog (5. *Hyla regilla*) is common everywhere west of the Sierra Nevada, and in the drier counties they even enter houses in summer, attracted by the slight exhalation of moisture from water tanks, etc. They are only about an inch long in the body, and have the power of slowly changing color to suit that of surrounding objects, thus concealing themselves. They vary from grass-green to olive, or marked with brown of various patterns.

The Toads are more terrestial than Frogs, and more or less covered with wart-like knobs. They feed chiefly at night, pursuing insects on the ground, and are thus very useful in the garden. The first-named, No. 6, grows four inches long, is nearly smooth, and has somewhat the habits of a frog in the Colorado valley—where this and the next are found—the other two near the coast, and grow two or three inches long. (6. *Bufo alvarius;* 7. *B. Woodhousii;* 8. *B. halophila;* 9. *B. Columbiensis.*) A kind of toad, with peculiar feet, is found in the northern part of the State, and the same, or a similar one, is also found at San Diego. The generic name means Spade-foot. (10. *Scaphiopus Hammondii.*)

The Salamanders are Lizard-shaped animals, generally with smooth shining skin, usually brightly colored, and nocturnal in habits, concealing themselves by day in damp places, under stones, etc. They are harmless insect-eaters, though superstition has invented many wonderful stories of their venomous and even supernatural qualities. Some kinds, called Newts, inhabit water, and all go into the water in spring, requiring much moisture at all seasons. Most of these are found only in the northern half of this State, or on high mountains southward, taking the place of the Lizards, which require heat and dryness. They are slow crawlers on land, but many swim rapidly, and are sometimes caught on fish-hooks. (11. *Ambystoma Californiense;* 12. *A. punctulatum;* 13. *A. macrodactylum;* 14. *A. tenebrosum;* 15. *A. mavortium;* 16. *A. ingens;* 17. *A. vehiculum.*) These are all confined to northern California and Oregon.

A slender species, (17. *Batrachoseps attenuatus*), two to three inches long, of which the name means "Slender Frog-Lizard," is found everywhere west of the Sierra Nevada; color black, bluish below.

A pale yellow-red species, five inches long, common in the Coast Range, and distinguishable from the rest by its smooth skin, has a name meaning the "Mournful Unknown," (19. *Aneides lugubris.*)

The Warty Salamander (20. *Diemyctelus torosa*) is one of the few species with dry, rough skin, dark reddish-brown above, orange beneath, and is more able to withstand dryness than the others, being often found in the mountains travelling by day.

The "Fish-Lizard, Four-legged Fish, or Mud Pup," (21. *Siredon —— ?*) is one of the curious links between reptiles and fish, having gills on the *outside* of the neck, and inhabiting water only. A species is said to be found in the mountain lakes of the northern Sierra Nevada, but has not been yet named. A black kind, eight inches long, with membranous, fin-like expansions, is found in the Columbia river.

## FISHES.

With this class California is probably better supplied than any other equally populous portion of the civilized world, as regards either abundance, excellence, or variety. Not only are our own markets fully stocked at all seasons, but great quantities are salted or dried for use in the mines, and for exportation to China—the latter business being chiefly carried on by Chinese. That king of fishes, the Salmon, is plentiful in spring in many of our rivers, and Trout of large size and excellent quality abound in our mountain lakes. The marine fishes furnish hundreds of species, most of which have no English name, or are given the name of some Eastern or European fish, often quite different. On this account, and because little is yet known concerning the habits and range of our fishes, a very brief enumeration only can be given here. Nearly all those found on this coast were new to naturalists in 1850, and since 1859, the date of the Pacific Railroad General Report on fishes, no less than fifty species have been discovered here, while many, doubtless, yet remain undescribed. The whole number already determined is one hundred and ninety-four.

### BONY FISHES.

### Percidæ—Perch Family.

The Giant Perch (1. *Stereolopis gigas*) was first described by Dr. W. O. Ayres, of San Francisco, in 1859. It resembles the little fresh-water perch in form, but grows to the enormous length of seven feet, weighing three hundred and sixty pounds, the proportions of one caught in San Francisco Bay, and described by Dr. Ayres. They are not uncommon along the southern part of the coast, but not much caught, as they usually carry off the fisherman's hooks, and when taken are coarse food. They are also called "Jew Fish."

Two species, called "Basse," are caught south of Monterey, and are pretty good eating. They grow about two feet long, are olive above, spotted or clouded black. (2. *Paralabrax nebulifer;* 3. *Atractoperca clathrata.*) A fresh water Perch (3. *Archoplites interruptus*) is common in the interior rivers, and about equal to the Perch of other countries in size and flavor. The viviparous and other fish are also called "Perch."

### Latiloidæ.

A species called "Whitefish," (4. *Caulolatilus anomalus*), but quite distinct from any fish called so elsewhere, grows three feet long, and inhabits the southern waters of this State, but is not so good eating as the lake Whitefish, (*Coregonus.*)

### SCIÆNIDÆ—KINGFISH FAMILY.

The Grunter, (5. *Rhinoscion saturnus*), is a species about a foot or two in length, caught on the southern part of our coast, and good eating.

The "Corvina," "Cognard," or "Little Basse," (6. *Leiostomus lineatus*), grows a foot long, and is caught in San Francisco Bay, but more common southward, and is a good fish.

The Californian King-fish (7. *Umbrina undulata*) is a southern coast species, little known, but believed to grow over two feet long, and is good eating.

The "Big Basse," (8. *Atractoscion nobile*), is a fish caught abundantly at San Francisco, and southward, growing five feet long and weighing seventy pounds. It is one of the best sea-fish sold in our markets. Another small species, (9. *Seriphus politus*), growing eight inches long, is caught in San Francisco Bay, but is rare and little known, with no common name. It may be called the California Weak-fish..

### CHÆTODONIDÆ—MOON-FISH FAMILY.

Two fish which have no common names are found on our southern coast, the second extending to San Francisco but rarely. The first grows six inches, the second a foot long. Many of the tropical fish of this family are brilliantly colored. (10. *Parephippus zonatus;* 11. *Girella nigricans.*)

### POMACENTRIDÆ.

The Californian "Gold-fish" (12. *Glyphidodon rubicundus*) grows nearly a foot long, and resembles the common Gold-fish kept in vases, both in form and color, though different in anatomical character—that fish belonging to the Carp family. It is found about our southern islands.

The Californian Chromis (13. *Chromis punctipinnis*), is a blackish perch-like fish, with spotted fins and tail, found about the islands and southern coast, where they are caught for food, but are not so good as the true Perch.

### EMBIOTOCOIDÆ—VIVIPAROUS PERCH.

This family, peculiar to the North Pacific, and so interesting on account of their mode of reproduction, unlike that of nearly all other scaly fishes, has numerous representatives on this coast, varying from the size of a gold-fish to a foot long, and a weight of about a pound. None of them are considered very good, though all are eaten, and command an extra price from the Chinese, who dry them in large quantities for export to China. They have been described by several naturalists under different names, but the following are those now considered correct. The first species only is an inhabitant of the interior rivers, the remainder being caught along the whole coast, and from their usual resorts on the open sea beaches, are often called "Surf Fish." (14. *Hysterocarpus Traskii;* 15. *Embiotoca Jacksoni;* 16. *E. argyrosoma;* 17. *Tæniotoca lateralis;* 18. *Hypsurus Caryi;* 19. *Damalichthys vacca;* 20. *Phanerodon furcatus;* 21. *Cymatogaster aggregatus;* 22. *Rhachocheilus toxotes;* 23. *Amphistichus argenteus;* 24. *Holconotus rhodoterus;* 25. *H. pulchellus;* 26. *Hyperprosopon argenteum;* 27. *H. arcuatum;* 28. *H. punctatum;* 29. *Hypocritichthys analis;* 30. *Brachyistius frenatus;* 31. *Abeona minima*).

### LABRIDÆ—TAUTOG FAMILY.

The "Redfish" (32. *Trochocopus pulcher*) is a thick, heavy fish, often weighing six or eight pounds, and over two feet long, black, the larger ones with a red band around the middle third of body. They are caught plentifully about the southern islands, and dried for transportation inland, but being a coarse fish, are not much used fresh, though sometimes brought to San Francisco market by vessels.

The "Kelpfish" (33. *Oxyjulis modestus*) is a fish a foot long, with very large scales, and of various colors, caught from Santa Cruz south, but not considered very good eating.

### CORYPHÆNIDÆ—DOLPHIN FAMILY.

The "Harvest-fish," or "Pompino," (34. *Poronotus simillimus*) is a rare species, brought to market in San Francisco and highly prized for the table. It grows about eight inches long, and is very similar to the Atlantic species.

### SCOMBRIDÆ—MACKEREL FAMILY.

The California Mackerel (35. *Scomber diego*) is very similar to the Atlantic species, but rather smaller. They are caught in great numbers some years, in September, at Monterey Bay, and southward. When fresh they are very good fish, but inferior in quality when salted.

The California "Bonito" (36. *Pelamys lineolata*) called by the Spanish "Caballero," and sometimes "Horse-mackerel," is a beautiful and excellent fish, growing three feet long, and caught along the southern part of our coast.

The Californian "Albicore" (37. *Orcynus pacificus*) is also a magnificent fish, and one of the best caught on the southern coast, when eaten fresh. It grows nearly three feet long, and weighs twenty-one pounds.

The California "Horse-mackerel" (38. *Halatractus dorsalis*) is a rare autumnal visitor as far north as San Francisco, and is not much esteemed for the table. It grows nearly four feet long, and weighs twenty pounds.

Two allied fish, growing a foot, or a foot and a half long, but too rare to be of much value, are found at San Francisco and San Diego, where they are sometimes called "Spanish Mackerel." Their sides each have a ridge of large sharp scales. (39. *Trachurus symmetricus ;* 40. *Paratractus boops*).

The "Serra," or Saw-fish of the natives (41. *Alepidosaurus serra*), is a remarkable snake-like fish, flattened laterally, and found very rarely at Monterey, washed ashore. It grows four feet long, and seven inches in circumference.

### SCOMBERESOCIDÆ—GAR-FISH FAMILY.

A species of Gar-fish, or "Bill-fish," (42. *Belone exilis*), is common along the southern part of our coast, and grows a foot or two long, but is of little value, though well flavored.

### SPHYRÆNIDÆ—BARRACOUTA FAMILY.

The California Barracouta (43. *Sphyræna argentea*) is caught abundantly from San Francisco south, in summer and autumn, and is one of our best fishes, either for the table or for sport in catching them, being taken like the Bonito, Albicore, Horse Mackerel, etc., by trolling with a fast-sailing boat. They grow four feet long, and are of slender form.

### ATHERINIDÆ—SILVERSIDE FAMILY.

Three species called here "Smelt," and thus confounded with the true Smelts (*Osmerus*), mentioned hereafter, are more or less common. The first grows a foot and half long; the others less, being about eight and six inches. All are justly esteemed as food, but inferior to the true Smelts. (44. *Chirostoma Californiensis ;* 45. *C. affinis ;* 46. *C. tenuis.*)

### EXOCŒTIDÆ—FLYING-FISH FAMILY.

The California Flying-fish (47. *Exocœtus Californicus*) is a species growing fifteen inches long, and often caught along the southern part of our coast, where it flies on board of small vessels, but is not very good eating.

### CHIRIDÆ—CHIRUS FAMILY.

Four species called here "Sea Trout," are commonly caught near San Francisco and northward, growing about a foot and a half long, and are beautifully spotted with black in various patterns on a light ground. They are not very superior for the table. (48. *Chirus constellatus;* 49. *C. pictus;* 50. *C. guttatus;* 51. *Acantholebius nebulosus.*)

A fish called "Cod" in San Francisco, though quite different from the true cods, both in form and flavor, is common along the whole coast, and grows four feet long, being green or yellowish, spotted and clouded black. (52. *Oplopoma pantherina*)—Panther Fish.

A fish which may be called "False Pollack," as it resembles that fish as much as No. 52 does the Cod, is occasionally caught near San Francisco, growing about eighteen inches long, and of plain olive tints. (53. *Anoplopoma merlangus.*)

### GASTEROSTEIDÆ—STICKLEBACK FAMILY.

Several species are abundant in the brackish and fresh waters of this State, but interesting only for their curious habits of nest-building, etc., which make them favorites in the aquarium. (54. *Gasterosteus serratus;* 55. *G. plebeius;* 56. *G. microcephalus*; 57. *G. Williamsonii.*)

### SCORPÆNIDÆ—SCORPION-FISH FAMILY.

The Californian Scorpæna (58. *S. guttata*) is not uncommon from Monterey south, and grows a foot long. It is, like others of the family, rather forbidding in aspect, but pretty good eating, and confounded with the following by the name of Rock Cod.

The Californian "Rock Cod," "Groupers," or "Snappers," are of several species, one or more of them caught at every portion of our coast, and are favorite fish for the table, having large bones chiefly, and a resemblance to the Cod in taste, from which they were probably named, as they look very unlike those fish, and resemble the preceding. The various species are distinguishable by colors, being black, rose-red, blood-red, olive, or variously spotted in constant patterns. (59. *Sebastes nigrocinctus;* 60. *S. nebulosus;* 61. *Sauriculatus*; 62. *S. ruber*; 63. *S. ocellatus*; 64. *S. elongatus*; 65. *S. paucispinis*; 66. *S. ovalis*; 67. *S. flavidus*; 68. *S. melanops*; 69. *S. rosaceus.*) Some of them weigh as much as twenty-five pounds.

Allied to these is a rare fish caught near San Francisco, and only about six inches in length, as far as is known, (70. *Trichodon lineatus.*) Another, equally rare, but believed to be common farther north, is somewhat similar, but probably belongs to the next family, (71. *Blepsias trilobus?*)

### COTTIDÆ—SCULPIN FAMILY.

Numerous species are common both in salt and fresh waters on this coast, those of the former usually called Sculpins, or Bullheads, the others sometimes "Miller's Thumbs." The first two mentioned are caught chiefly in fresh waters, the third goes up the rivers to spawn, and the rest are confined to salt waters. Though most of them are eaten, they are not considered very good. (72. *Cottopsis gulosus;* 73. *C. parvus;* 74. *Leptocottus armatus;* 75. *Oligocottus maculosus;* 76. *O. analis;* 77. *O. globiceps*; 78. *Leiocottus hirundo*; 79. *Scorpænichthys marmoratus*; 80. *Aspicottus bison*; 81. *Hemilepidotus spinosus*; 82. *H. Gibbsii*; 83. *H. notospilotus*; 84. *Calycilepidotus lateralis*). They are not over a foot long, and are grotesque fish both in form and coloring.

### BLENNIDÆ—BLENNY FAMILY.

The "Wolf-eel" (85. *Anarrichthys ocellatus*) is a remarkable fish, often four to five feet long, in shape like a thick eel, with enormous mouth and strong teeth, its body covered with round spots. They are caught near San Francisco and Monterey, are very voracious and fierce, and not bad as food. They are allied to the Atlantic Wolf-fish.

The remaining fishes of this family are generally of small size, and though curious in form and color, of little or no value as food. The first in the list below is sometimes sold in the market by the name of eel, though only a foot long, and, like the last, much more flattened on the sides than the true eels. Several others have similar forms, and, if common enough, would doubtless be also called "eels." All except the last three—which have only been found southward—are caught between San Francisco and Monterey. (86. *Xiphidion mucosum*; 87. *Lumpenus anguillaris*; 88. *Apodichthys flavidus*; 89. *Cebidichthys crista-galli*; 90. *C. violaceus*; 91. *Gunnellus ornatus*; 92. *Blennius gentilis*; 93. *Neoclinus Blanchardi*; 94. *Pterognathus satiricus*; 95. *Heterostichus rostratus*; 96. *Gibbonsia elegans*).

### BATRACHIDÆ—TOAD-FISH FAMILY.

A species about a foot long, and generally rejected by fishermen, on account of its ugly appearance, is found all along the coast. (97. *Porichthys notatus*).

### GOBIDÆ—GOBY FAMILY.

These are small fishes, only a few inches long, but of remarkable form and structure, living chiefly in muddy bays, on the bottom. Our three known species are caught near San Francisco. (98. *Lepidogobius gracilis;* 99. *Eucyclogobius Newberrii;* 100. *Gillichthys mirabilis.*)

### CYCLOPTERIDÆ—LUMP-FISH FAMILY.

These are small fish, a few inches long, found under stones at low water, and having the power of adhering firmly to any object by means of their ventral fins, which are formed like the common leather sucker used as a toy by school-boys. (101. *Caularchus reticulatus*; 102. *Liparis pulchellus*; 103. *L. mucosus*).

### PLEURONECTIDÆ—FLAT-FISH FAMILY.

These strangely shaped, though common and favorite fish, have the body twisted around and flattened so as to bring both eyes on one side, which is always turned up as they swim along the bottom of salt water. All of our species are good eating, but some of superior quality are called "Soles," from their resemblance to that celebrated European fish; (Nos. 107, 114). Another is called Turbot, though not the same as the Atlantic fish so called; (No. 106). The two first are species of Halibut, one closely resembling the Atlantic fish, and grow over four feet long, the latter sometimes weighing five hundred or six hundred pounds. Both are caught near San Francisco. (104. *Hippoglossus Californicus;* 105. *H. vulgaris?* 106. *Platichthys stellatus;* 107. *Parophrys vetulus;* 108. *Parophrys? Ayresii;* 109. *Platessa? bilineata*; 110. *Paralichthys maculosus*; 111. *Pleuronichthys cœnosus*; 112. *P. Hubbardii*; 113. *Hypopsetta guttulata*; 114. *Psettichthys melanostictus*; 115. *P. sordidus*; 116. *Metoponops Cooperi*).

### GADIDÆ—COD FAMILY.

These fine and valuable fish are represented so far south by only a few small species—very good eating when fresh. Abundance of salt cod are, however, brought to this market from the North Pacific, as fine as those of the Atlantic, and the trade now employs several vessels annually, with a prospect of a vast increase since the acquisition of Alaska, as they are caught in immense numbers on that coast.

The California Whiting, or Hake (117. *Merlucius productus*) is rather rare in the San Francisco market, but common further north. It grows two feet long, and is one of the best of our fish.

The Californian Codling, or Cusk (118. *Brosmophycis marginatus*) is also rare, and is known by its fins and tail being tipped with vivid red. It is, doubtless, also a good table-fish.

The Pacific Tomcod (119. *Gadus proximus*) is a little species caught in large numbers in San Francisco Bay during the colder months, but does not grow over six inches long. It is, however, a very good pan-fish. The "Masked Sand-Lauce" (120. *Ammodytes personatus*) is an allied fish, of small size.

### OPHIDIDÆ—SAND-FISH FAMILY.

A very small species (121. *Ophidion Taylori*), only three or four inches long, is found in the sands of Monterey beach.

### SALMONIDÆ—THE SALMON FAMILY.

These fish are probably the most important caught along our coast and in the rivers, both on account of their abundance and their excellence as food. The Salmon enter the rivers chiefly along the northern half of the coast in spring and fall, and are caught in great numbers.

The Spring Salmon (122. *Salmo quinnat*) comes in the first months of the year, and specimens have been caught weighing sixty-four pounds, or even more, the usual mode being with gill-nets, set in the Sacramento river.

The Fall Salmon (123. *S. Scouleri*) is less abundant, and the males are known by having a hooked snout. More of them are taken towards the north, and great numbers are salted or smoked for our market. Their average weight is eight to twelve pounds.

The Salmon Trout (124. *S. Masoni?*) is a species rarely over two feet long, caught in spring in the small streams running into San Francisco Bay, and probably all along the northern half of the State. It is considered superior to either of the others.

A White Salmon of small size (*S. aurora?*) is found in the ocean and mouths of streams in summer, but is probably merely the young of No. 121.

The Northern Brook Trout (125. *Salmo stellatus*) is common in the mountain streams and lakes of the Sierra Nevada, where they often grow two feet long, and in Oregon are said to weigh at times fifteen pounds. They are excellent fish, either for the table or for angling, biting readily at most seasons.

The Coast Range Trout (126. *Salmo iridea*) is abundant in most of the clear western waters of the State, and furnishes much sport in summer for city anglers visiting the country. It scarcely ever reaches the length of a foot.

The Western Whitefish (127. *Coregonus Williamsonii*) is a species caught plentifully in Lake Tahoe and northward along the Sierra Nevada. It measures a foot or two in length, and is nearly as good as the trout, to which it is related.

Two species of true "Smelts" are caught near San Francisco, and sold in the market with the larger but inferior "Shiners." (See *Atherinidæ*). They are not over seven inches long, and may be distinguished by having the posterior dorsal fin very small and thickened with fat, as in all of the Salmon Family. (128. *Hypomesus pretiosus*; 129. *Osmerus thaleichthys*).

### SCOPELIDÆ—STONE-FISH FAMILY.

130. *Synodus lucioceps* is a very rare and curious little fish caught in San Francisco Bay, and little known.

### CLUPEIDÆ—HERRING FAMILY.

The California Shad (131. *Alausa Californica*) is a rare species as far as known, and only taken as yet near San Francisco.

Two species of Herrings are caught along nearly the whole coast, and in great numbers. Though of different structure they are not distinguished by fishermen as of different quality, and in the great abundance of better fish are not much used fresh, though salted or dried to some extent, especially by Chinamen. (132. *Clupea mirabilis*; 133. *Meletta cœrulea*).

Several species of Anchovies, or Sardines, remarkable for their size, are caught plentifully along the whole coast. Though of a tribe celebrated as a delicacy in Europe, they have not yet attracted much attention here. (134. *Engraulis mordax;* 135. *E. delicatissimus*; 136. *E. compressus*; 137. *E. nanus*). Length from three to six inches.

### CYPRINODONTIDÆ—KILLY-FISH FAMILY.

Three little species, not exceeding four inches long, and of no known use except for bait, are caught along our southern coast. (138. *Cyprinodon Californiensis*; 139. *Fundulus parvipinnis*; 140. *F.* ——?

### MURÆNIDÆ—EEL FAMILY.

The Pacific Conger (141. *Murœna mordax*) is common near our southern coast and islands, where they grow to a length of four feet or more, and are considered good eating.

The Californian Snake-fish (142. *Ophidiurus Californiensis*) is caught rarely at San Francisco and southward. It resembles an eel in form, and grows twenty inches or more in length. (*Myrichthys tigrinus*, Girard, from Astoria, Oregon, may be the same).

### CYPRINIDÆ—CARP FAMILY.

Many species are caught in the fresh waters of this State, but none are considered very good eating, as better fish are generally obtainable. The first three, are universally called Suckers, and, as well known, have the mouth underneath the head. They grow a foot and a half long. (143. *Catostomus occidentalis*; 144. *C. labiatus*; 145. *Acomus generosus?*)

We have no fish very much like the Carp in form, and several of our largest species of this family are so unlike any English or American kinds that no distinctive name has yet been given to them. The two following have been sold in San Francisco market as "Salmon Trout," but their very inferior quality soon exposes the imposition. They grow to a weight of six or eight pounds, and in external form are not very unlike trout. (146. *Mylopharodon robustus* ; 147. *M. conocephalus*, young of same?) A closely allied fish, (148. *Mylocheilus fraterculus*), resembling the English Barbel, is caught in the rivers near Monterey.

The first mentioned below has also been sold under the name of Salmon Trout, though quite distinct from No. 146, except in color, which is nearly alike in all our Cyprinoids. It grows to the length of three feet, weighing sixteen pounds, and it is said even as high as thirty. The second is confined to the Colorado river, having nearly the same appearance, and is there called "Salmon," though a poor substitute for that fine fish—there unknown. The third, very similar, is caught near Monterey. (149. *Ptychocheilus grandis* ; 150. *P. lucius* ; 151. *P. rapax.*)

The next two most resemble the "Buffalo-fish" of the Mississippi valley, old ones having the back very much humped, and are confined to the Colorado valley, where they are about the best fish caught. They grow a foot or two in length. (152. *Gila robusta* ; 153. *G. elegans* ; probably young of No. 152.)

Of the following, No. 154, resembles the English Dace, and is found in Tulare valley. Nos. 155 and 156, inhabiting the San Joaquin and Sacramento valleys, come nearest to the Roach. No. 157 may be called a Tench, and is also from the San Joaquin. None of them are known to exceed a foot in length. (154. *Luxilus occidentalis* ; 155. *Tigoma conformis* ; 15.6 *T. crassa* ; 157. *Siboma crassicauda.*)

No. 158 is near enough to the English Bleak to inherit that name, and inhabits the Sacramento. No. 159 inhabits the southeastern rivers, (Merced, Mohave, etc.), and, with allied species, resembles nearly the true Minnow, growing about six inches long. Nos. 160 and 161 are nearest to the Chub, and inhabit the San Joaquin, Salinas, etc. The former has been also sold by the names of "Pike," and "Herring ;" the name "Pike" being also given sometimes to Nos. 149, 150, 151, 152, and 153—though there are no true Pike west of the Rocky Mountains. (158. *Orthodon microlepidotus* ; 159. *Algansea formosa* ; 160. *Lavinia exilicauda* ; 161. *L. harengus.*)

The remaining species are like the English Gudgeon in form, having little cord-like feelers at the sides of the mouth, and may go by that name. They inhabit the interior rivers, growing about a foot long, and are probably the fish called "split-tail" in some places. (162. *Pogonichthys inæquilobus* ; 163. *P. symmetricus* ; 164. *P. argyrei-*

*osus*). Further comparison will probably unite these species, and perhaps others of this family.

### CARTILAGINOUS FISHES.

These have the skeleton only partly ossified, and many have no bones at all (unless the teeth are called bones) their place being supplied by a cartilaginous frame. Some have the skin thickened into a kind of shell, and in nearly all, the ordinary scales are modified into bony plates, spines, or altogether wanting. They are not generally eaten.

The California Sun-fish (165. *Orthagoriscus analis*) resembles that of the North Atlantic, having a nearly circular form, with the fins behind. One has been taken near San Francisco seven and a half feet in length, and weighing 632 pounds ! They are sometimes harpooned for the oil they contain.

The California Balloon-fish (166. *Gastrophysus politus*) is slightly prickly, a foot long or more, and can swell itself out, when irritated, into a nearly globular form. Found as yet only near San Diego.

The Large Sea-horse (167. *Hippocampus ingens*) is about nine inches long, and like the Atlantic species has the head formed like that of a horse, the body enclosed in an angular plated armor, and the long tail suited for holding on to sea-weeds, etc. It has only been met with at San Diego and southward

The Pipe-fish furnish us several species, much like those of the Atlantic ; slender, plated fish, with the mouth drawn out into a tube, open at the end. They are found along the whole coast, and grow six to twelve inches long. (168. *Syngnathus Californiensis* ; 169. *S. griseolineatus* ; 170. *S. leptorhynchus* ; 171. *S. dimidiatus* ; 172. *S. arundinaceus* ; 173. *Dermatostethus punctipinnis*).

The Sturgeons enter the rivers near San Francisco, and north, in large numbers, and are of great size. The first mentioned is called White Sturgeon, and is the largest fish sold in the markets, often weighing one hundred to one hundred and fifty pounds, and sometimes as high as three hundred. The second, called "green," is, however, said to grow fifteen feet long, and to weigh eight hundred pounds ! The third is little known. (174. *Antaceus brachyrhynchus* ; 175. *A. acutirostris* ; 176. *A. medirostris*).

The Elephant-fish, or Skooma, (177. *Hydrolagus Colliei*) is a curious, shark-like fish, two feet long, and with a pointed tail, an elongated snout, and plate-like teeth. The Indians esteem them as food.

The Sharks are numerous along our whole coast, and some of the larger kinds are taken in large numbers for the oil which is extracted from their livers. The first is known to grow six feet in length, and sharks of ten feet are said to follow vessels near the coast—perhaps of the second species. The others have not been found over three or four feet long, and no instances of any of them having attacked persons when bathing have been recorded. (178. *Notorhynchus maculatus* ; 179. *Isoplagiodon Henlei* ; 180. *Triacis semifasciatus* ; 181. *Gyropleurodus Francisci* ; 182. *Acanthias Sucklii,* the Dog-fish ; 183. *Sphyramalleus,* the Hammer-headed Shark; 184. *Alopias vulpes?* the Thrasher.) The California Angel-fish (185. *Rhina Californica*) is like the Atlantic species, a sort of wide-flattened Shark, with wing-like fins on each side, and grows three or four feet long. It occurs rarely near San Francisco.

The Ray family has also many representatives, but they are not considered of much use, though some are eaten by the Chinese and others. The first grows four feet long ; most of the others are nearly as broad as long, or broader, and the Torpedo much resembles that of the western Atlantic. The three last, called Sting-rays, have a spine in the tail, with which they inflict severe wounds. Some of these have been found eighteen feet wide. (186. *Rhinobatus productus* ; 187. *Rhinoptera vespertilio* ; 188. *Uraptera binoculata* ; 189. *Torpedo Californica* ; 190. *Urolophus Halleri* ; 191. *Pteroplatea marmorata* ; 192. *Trygon —— ?*)

The Lampreys are the Eel-like fish of this division. They have no bones, and scarcely any teeth, only sufficient to make a slight incision in the skin of the fishes on which they fasten themselves to suck their blood like leeches, thus forming a link with the next lower class of animals. They enter the fresh water streams in large numbers in spring, and are occasionally caught by hand in shallow waters, being highly prized by some foreigners, though not much esteemed by Americans. They grow two or three feet long. (193. *Lampetra plumbea* ; 194. *Entosphenus epohexadon* ; 195. *E. ciliatus.*)

Finally, there is a little worm-like fish found as yet only at San Diego, (though similar ones occur on the shores of the Atlantic), so low in development that it has *no eyes, heart, or even brain,* and looks like a bit of white gristle, flattened at the sides, and tapering towards each end. It may be called the "Worm-fish," (196. *Branchiostoma* ——— ?) Its length is about two inches, and it lives buried in the sand.

## MOLLUSCA—SHELL-FISH.

To mention the numerous species of this class found in California would be impossible here, so we must limit this notice to a few eatable kinds.

The so-called "Date Fish," or "Rock Oysters," are several species of bivalves, which bore into soft rocks or clay between tides, from which they are easily extracted, and are considered among the best of the class for the table. Similar kinds are called "Piddocks" on some parts of the Atlantic shores. (1. *Zirphæa crispata*; 2. *Pholadidea penita*; 3. *Parapholas Californica*).

Some other harder-shelled species are found with these and not usually distinguished, though much inferior for eating. (4. *Saxicava pholadis*; 5. *Platyodon cancellatus*).

Much larger shell-fish, burrowing in softer earth, are occasionally obtained, and called Squirt-clams. Their shells are often six inches long, and one animal enough for a good meal. (6. *Glycimeris generosa*; 7. *Schizothærus Nuttalli*).

Several kinds, called Razor-fish, are found in the sandy sea-beaches and bays, but have not yet been much sought for, though considered about third rate for eating. (8. *Solen sicarius*; 9. *Solecurtus Californianus*; 10. *Machæra patula*).

Several kinds, confounded as "Soft-shell Clams," are abundant along several parts of the coast, and some of them much eaten, though liable to have sand or mud inside the shell. They grow three or four inches wide, and are flattened. (11. *Sanguinolaria Nuttalii*; 12. *Macoma secta*; 13. *M. nasuta*; 14. *Tellina Bodegensis*). Several others might be mentioned, but are rarely obtained alive.

The "Hard-shell Clams," "Quahogs," etc., are numerous, and therefore much eaten, though inferior to most of the preceding for the table. They are dug at low water in most sandy bays, and the largest grow only about four inches wide. (15. *Chione succincta*; 16. *Tapes tenerrima*; 17. *T. laciniata*; 18. *T. staminea*; 19. *Saxidomus gracilis*; 20. *S. Nuttallii*). No. 18 is the most common at San Francisco.

The "Cockles" are sometimes dug for food, but not so commonly, though very good for soups. They are sometimes four inches wide and three in thickness. (21. *Cardium corbis*; 22. *C. quadragenarium*).

The "Mussels" are abundant along the whole coast, and the first named is most common, growing sometimes nine inches in length. The second, also found in the North Atlantic, is smaller, and found chiefly in brackish bays. (23. *Mytilus Californianus*; 24. *M. edulis*).

The "Fresh-water Mussels" are found in all the larger interior streams, but rarely eaten, though not unpalatable. Pearls may be found in them occasionally, especially in the first. (26. *Margaritana falcata*; 27. *Anodonta angulata*; 28. *A. Californiensis*; 29. *A. Oregonensis*; 30. *A. Wahlamatensis.*)

Several species of Scallops are found along the coast, but not much eaten, though doubtless as good as those of the Atlantic. The largest species are mentioned, growing four inches wide and an inch thick. (31. *Pecten hastatus*; 32. *P. ventricosus*). A very large kind, often with a shell six inches long and four wide, but irregular and rough outside, is rather common, and the shells often mistaken for those of Oysters, though when young they are perfect Scallops. (33. *Hinnites giganteus*).

The Oysters native in our bays are rather small in size, but great quantities of larger ones are brought from the more northern coast and planted in San Francisco Bay, where they become very good. A Mexican species is also brought here, which grows four or five inches long, but these large ones are considered too tough. The attempt is being made to naturalize them in the bay. (34. *Ostrea lurida*; 35. *O. conchaphila*).

Of the Univalves very few are eaten, though they will probably be more used when better known, as many of their allies are on both coasts of the Atlantic. Some of the largest Snails are eaten, chiefly by foreigners, and are said to be equal to the European species, so much prized by some epicures. They grow about an inch or an inch and a half high and wide. (36. *Helix arrosa*; 37. *H. tudiculata*; 38. *H. fidelis*; 39. *H. infumata*, and perhaps others).

Some of the "Abelonés," or "Ear-shells," growing here ten inches in width and two deep, are much sought for, though the foot, which alone is eaten, is very tough and needs much pounding. They are numerous on many parts of the coast, and large numbers are dried by the Chinese. (40. *Haliotis Cracherodii*; 41. *H. rufescens*; 42. *H. splendens*; 43. *H. corrugata*, the last two rare). The shells are also exported for inlaying work.

The Limpets are eaten on other coasts, and our largest species here also occasionally, but not much in request. It grows two inches long. (44. *Lottia gigantea*, and probably some *Acmeas*).

Some of the large Top-shells, found here from two to three inches high, and the same in width, are eatable, but have not been much used. (44. *Pomaulax undosus*; 45. *Pachypoma gibberosum*). Our "Periwinkles" (*Littorina*) are too small to be eaten.

Our large "Sea Snail," (46. *Lunatia Lewisii*), growing five inches wide and nearly globular, is eaten by the Indians, but has not attracted much attention from others.

Several, which may be called "Whelks," as they resemble more or less the Atlantic species so called, grow four or five inches long, and are doubtless quite as good as that animal for food, but have not yet been offered for sale, though many could be obtained by proper means. (47. *Priene Oregonensis*; 48. *Ranella Californica*; 49. *Nassa fossata*; 50. *Purpura crispata*; 51. *Chorus Belcheri*; 52. *Chrysodomus tabulatus,* and many smaller kinds).

Of "Cuttle-fish" and "Squids," of which many kinds are eaten in Europe, and much used for bait on the Atlantic coast, we have several species, some growing three feet long, their arms stretching seven feet. They are much used by the Chinese, who consider them a luxury, and dry many for export to China. Among them is the kind which forms the beautiful Paper Nautilus, or Argonaut Shell. (53. *Argonauta Argo*; 54. *Octopus punctatus*; 55. *Ommastrephes giganteus*).

## CRUSTACEA.

### Crabs, Lobsters, Shrimps.

These animals are abundant and large on our coast, but few species are used as food, although many more might doubtless be so.

The "Crabs" common in San Francisco market are of the following species, the first and largest of which grows six or eight inches in width, and all are excellent eating. (1. *Cancer magister*; 2. *C. antennarius*; 3. *C. productus*). A vast number of strange and little known species of Crabs are found in the salt waters, some of them growing over a foot in breadth, but too rarely caught to be used as food.

The "Lobster," which, however, has not the large claws of the Atlantic species, grows a foot and a half long, and is a favorite luxury, brought by steamers in large numbers from Santa Barbara. (4. *Panulirus interruptus*).

The "Shrimps" are caught abundantly in the bays, and almost always plentiful in market. They grow three inches long. (5. *Crangon Franciscorum*; 6. *C. nigricauda*).

"Crawfish" are also found in the interior, burrowing in the muddy banks of fresh water streams, and are doubtless very good eating, some being four or five inches long. (7. *Astacus* ——?)

# CHAPTER VIII.

## FLORA.

General Remarks—Sequoia—The Mammoth or Big Trees—Redwood—California Pines—Oaks—Cedars—Firs—California Nutmeg—California Yew Tree—Laurel—Manzanita—Madrona—Horse Chestnut, or Buckeye—Shrubs and Plants—Poison Oak—Alder—Barberry—Canchalagua—Pitcher Plant—Yerba Buena—Flaxworts—Flea-bane—Soap Plant Grasses—Catalogue of Native Trees of California.

It appears from the reports of Botanists, over eighty of whom pursued their labors in California and Oregon, between the years 1792 and 1865, that only eighteen hundred different species were collected during that period. Of these eighteen hundred species, seventy-four per cent. are found in the collections of the State Geological Survey and of the California Academy of Sciences. Five per cent. are new to science, and eleven per cent. new to California. The Flora of California presents many original and striking features; the trees, shrubs, plants, flowers, and even the mosses, ferns, etc., while bearing a general resemblance to corresponding orders and genera elsewhere, are here marked by strong individual peculiarities; and in many instances the Flora exhibits examples wholly original—for instance, the Mammoth or Big Tree (*Sequoia gigantea*) and the Monterey Cypress (*Cupressus Macrocarpa*) occur nowhere out of California. The rapid growth of Californian vegetation is remarkable; the Botanist is surprised to find, after only a fortnight's absence, in revisiting the same locality, that not only most kinds of its flowering plants during that time have ripened their seeds, but that many new plants have made their appearance. The mountains of California are covered with forests of Pine, Cedar and Fir, exhibiting a great preponderance of coniferous over dicotyledonous trees, these conifers being restricted for the most part to the sea-coast and the mountain sides. Our streams are fringed with various deciduous trees and shrubs, whilst in the vast plains and prairie country of the valleys the prevailing plants are *gramineæ*, *compositæ*, *leguminosæ*, with a greater number of *liliaceæ* than in any part of the

Eastern States. This proportion seems to hold good until the foothills of the Sierra are reached, where a greater variety of species, as well as of genera and classes, are met with. Here the *gramineæ* diminish in number, while the *cruciferæ* and the *compositæ* greatly increase. Here, also, the *ranunculaceæ* and *geraniæ*, with numerous variously colored and brilliant *labiatæ* occur ; some of these mountain meadows, by the great variety of their flowering plants, outvying in this respect the most carefully selected flower gardens of the East. The same remark applies to the vegetation covering the several mountain ranges, these differences of form being so notable as to entitle them to a special Flora. Sometimes these distinctions are so broadly marked and obvious as to strike the casual observer, while again they are so slight and difficult of detection as to be found only by careful scientific analysis. In some cases these differences go to the essential properties of the tree or plant, while again they relate only to form, color, or other external characteristics. The principal reason of this mere dissimilarity is found in the fact that the Flora of California, owing to its isolated position, is purely indigenous. Cut off from all parts of the world by the great ocean that borders it on the west, and separated by the lofty Sierra and a succession of arid deserts from countries to the south and east, it has remained as when first shaped by the hand of nature. Its condition is normal, and, therefore, to some extent *sui generis*—a feature, that while it opens to the scientist a peculiarly inviting field, commands also, in many cases, the attention of the utilitarian and economist.

Confirmed by soil and climate, their original peculiarities have become so inherent in many of the species, that they do not thrive in other lands, and even refuse in some cases to grow at all ; thus, *Lilium Washingtonium*, (Kell.), and many seeds and young plants of California growth, have in numerous instances been tried in foreign soils, and though planted under the most favorable conditions, have failed to fructify or take root, or, if they did begin to vegetate, died soon after, or maintained only a feeble and sickly existence. On the other hand, a few of these California productions take kindly to their new homes, and become even more fruitful and vigorous than when growing in their native soil ; while it is worthy of remark that almost every plant of foreign origin finds in some part of this State a soil, climate, and other natural conditions, adapted to its constitutional requirements. In no other country is the range within which the products of the vegetable kingdom are capable of arriving at early and entire perfection so broad as in California. Practically it may be said, in this particular, to cover all the zones that belt the earth with climatic differences. In fact, there is scarcely a cereal, fruit, plant or tree, wherever the place of its nativity, that cannot be grown and matured in the open air in some part of California. It may not be found economical in all cases to attempt the culture of these products on an extended scale, nor is it affirmed that they can here be raised in every instance so readily as in the countries to which they are indigenous; but simply that such is the variety of our soil and climate, that a locality can be found in some part of the State, where all the vegetable products of the world can be grown at least as an experiment, and a very large class of them with the greatest success.

The number of forest trees, exclusive of shrubs, found growing north of San Francisco and south of the Columbia river, does not probably exceed fifty. Both in number and size, the *Coniferæ* greatly predominate. The forest trees are distributed among the following genera: *Pinus*, 8; *Abies*, 5; *Picea*, 3; *Sequoia*, 2; *Cupressus*, 2; *Thuja*, 1; *Lebocedrus*, 1; *Larix*, 1; *Taxus*, 1; *Torreya*, 1; *Quercus*, 5; *Populus*, 3; *Salix*, 5; *Fraxinus*, 2; *Acer*, 2; *Alnus*, 1; *Cornus*, 1; *Platanus*, 1; *Castanea*, 1; *Æsculus*, 1; *Arbutus*, 1; *Oreodaphne*, 1.

In California the forest growth ceases almost entirely at from ten thousand to eleven thousand feet altitude. On Mount Shasta all large trees disappear at an elevation of about eight thousand feet, only a few shrubs being found above this elevation. Of these shrubs a species of small pine, (*Pinus albicaulis*, or *P. flexilis* of the English botanist), grows in favorable places at a height of about nine thousand feet; some of these trees have here been so flattened and compacted in their foliage by the snow that a man can stand, and even walk upon them, without trouble. The Flora of this elevated locality conform more to that of the Arctic region than to that of most lofty mountains in the temperate zones.

At Mount Shasta, and in no other part of California, is found the *Protococcus nivalis*, or "red snow," one of the lowest forms of vegetable life, and peculiar to most high Alpine regions. It is the only sign of life above nine thousand feet, and makes its appearance from eight thousand to twelve thousand feet, tinging with a purple or crimson hue all this part of the mountain. When the snow is softened and warmed by the sun, the footprints of persons walking over it are stained with a blood-red color.

To collate within the space at our command the entire Flora of this State would be impracticable, therefore only a brief synopsis of the same will here be attempted. Much of the matter contained in the following notes has been drawn from the reports of Dr. A. Kellogg, H. C. Bloomer (Curator of Botany, California Academy of Natural Sciences), Prof. H. N. Bolander, and to Dr. Newberry, of the Pacific Railroad Surveying Expedition.

## SEQUOIA.

### THE BIG TREES.

*Sequoia Gigantea,* (the Mammoth or Big Trees.)—The *Sequoia* is found only in California—the *Sequoia Gigantea* only in a few localities—there being but six or seven groves, so far as known, in the entire State; though it is probable others exist in the unexplored regions of the Sierra Nevada. Three of these groves are in Mariposa county, one in Calaveras, one in Tuolumne, and one or two in Tulare county—the trees in the latter locality being scattered over a great extent of country, admit of their being considered one grove or several. The three Mariposa groves are within two miles of each other. The second one in size contains eighty-six trees ; the third, thirty-five. The Tuolumne grove contains ten trees—one or two of which are said to be thirty-five feet in diameter. The Calaveras mammoth grove was the first discovered, and has attracted many visitors.

One peculiarity of this tree consists in its bearing two kinds of leaves—those on the young tree, and on the lower branches of the larger one, being about five eighths of an inch long, and one eighth wide. They are set in pairs opposite each other, on little stems. The other kind of leaves grow on the branches that have borne flowers, are triangular in shape, about an eighth of an inch long, and lie close down to the stem. The cones, solitary, or two or three together on long pedicels, are not much larger than a hen's egg, whereas the cones of many smaller conifers of the Coast are larger than pine apples. The seeds of the *Sequoia gigantea* are not more than a quarter of an inch long, a sixth wide, and almost as thin as writing paper, it taking about fifty thousand of them to weigh one pound. The bark is constructed on a different plan from that of most other trees—it being deeply corrugated longitudinally. The corrugated layers are of a harder texture, and the interstices are packed with an elastic, spongy substance. It is reddish brown in color, generally very thick—on the large trees not less than eighteen inches. The wood is soft, elastic, straight-grained, free-splitting, light when dry, and red in color—bearing a close resemblance to red cedar, but the grain is not quite so even, and is very valuable. The big tree grows in a deep, fertile soil, and is always surrounded by a dense growth of other evergreens, comprising the various species of

Pine, Fir, Spruce, and California Cedar. Many young trees of the *Sequoia gigantea*, produced from the seed, are growing in gardens in California, in the Eastern States, and in Europe.

We have it on the authority of a statement made by Professor Whitney, at a meeting of the California Academy of Sciences, May, 1867, that among the remains of miocene plants found in the coal beds of Greenland, were fossilized portions of the *Sequoia*, or Big Trees—that region being now covered with almost constant snow and ice.

The larger of the standing trees in the Calaveras grove, range in size from 275 to 366 feet in height, and from 50 to 64 feet in circumference—some of the prostrate trees having originally been of larger dimensions than any of those standing. Many of the trees in the Tulare group are reported to be larger than any found in the Calaveras Grove, one of the former being, according to measurements made by members of the State Geological Survey, 106 feet in circumference at the base and 276 feet high. A part of this tree was burned away, the girth having been originally between 115 and 120 feet. It is proper to observe that nearly all these trees expand greatly at the base, measuring much less ten or fifteen feet above than they do immediately at the ground; hence, where accuracy is desired, it should be known at about what height the measurement is made. The tree above mentioned as having a girth of 106 feet at the roots gave but 76 feet when measured at a point only twelve feet above the ground.

### REDWOOD.

*Sequoia Sempervirens*, (Endl.), Redwood.—This tree, first discovered by Menzies, in 1796, is only second in size, while it stands first in commercial value among the mighty forest trees of California, though not much superior to the sugar pine in either respect. Douglass, in speaking of it, declares that its appearance upon the mountains of California is so majestic as to inspire the beholder with emotions of awe. The Redwood belongs exclusively to the foggy regions of the Coast Ranges, and the underlying metamorphic sandstone, for wherever either of these is wanting the tree does not exist. From the northern boundary line of the State down to the head of Tomales bay it forms a continuous forest, increasing in width northward. At Tomales bay the chain is interrupted by a small bed of lime rock. The interruption extending from the lower foot-hills of Tamalpais down to Belmont, is undoubtedly owing to the lowness of the hills. A connecting link is found, however, on the Oakland hills; the grove of redwood found there, now almost entirely destroyed, affording the strongest evidences of the dependency of this species on the prevalence of heavy mists. Extending from Belmont to a few miles below Santa Cruz, is another narrow continuous forest of these trees, occupying mainly the tops and western slope of the mountains and the deeper gulches eastward. From near the mouth of Salinas river to the head of Carmelo valley, another long interruption is caused by the occurrence of a bituminous slate formation. The absence of redwood in this long interval can hardly be ascribed to any other cause, inasmuch as Monterey and the adjacent regions are subject to heavier fogs than Santa Cruz. *Pinus Insignis*, and *Cupressus macrocarpa*, occupy here those portions naturally belonging to the redwood and *Tsuga Douglasii*. Further south, from the head of Carmelo valley to San Luis Obispo, its most southern limit, redwood occurs but sparingly, forming nowhere extensive groves.

Associated with the redwood, we find *Tsuga Douglasii*, a tree having a wide range; *Torreya Californica*; *Arbutus Menziesii*; *Quercus densiflora*; and in Mendocino county, *Abies grandis*, (Dougl.); together with some shrubs and herbaceous plants bearing its characteristics. The shrubs, which increase as followed northward, belong mostly to the Ericacæous family. It is a noteworthy fact that the arborescent growth on the seaward side of the first range of hills generally consists almost exclusively of *Tsuga Douglasii*—this tree forming the outskirt east, and particularly westward. In Mendocino county *Abies grandis* unites with it for the same cause—both these trees there forming a dense belt facing the ocean, and are encroaching fast on the redwood. In fact, the western portion of those redwoods show this encroachment most strikingly by a total absence of young trees, while a dense undergrowth of the two mentioned species is springing up. The order of things is reversed, however, wherever the redwood has been removed. Its roots are imperishable, and as soon as the tree is cut they sprout and cover the soil rapidly, to the exclusion of every other species—none other being of so rapid a growth. The indestructibility of the roots renders the clearing of such land difficult; even the stumps of large trunks cut down cover themselves within two or three years so completely with sprouts that they can hardly be seen. The entire aftergrowth now found on the Oakland hills is owing solely to the indestructibility of the roots and stumps of the original forest. The tenacity of life in this species, of rather rare occurrence in Coniferous trees, shows itself also in the resistance it offers to fire. Trees bereft completely of their branches by this element cover themselves in a few years entirely with young sprouts, giving the trunks the appearance of a pillar, or one of those old trees often seen in the east covered with *Rhus toxicodendron*. Even trees, after they have obtained a thickness of a foot or two, are not liable to suffer from the effects of fire.

Another property peculiar to this species, is the great power it possesses in condensing fogs and mists. A heavy fog is always turned by it into rain, wetting the soil and supplying springs with water during the dry season; hence, springs situated in or near the redwoods are seldom in want of a good supply, while crops on the Coast Range are not liable to fail. It will surely happen that if the redwoods are destroyed, and they necessarily will be if not protected by law, certain portions of California, now fruitful, will become comparatively a desert. The unhappy experience of other countries, such as Asia Minor, Greece, France and Spain, should admonish us of the fatal effects of suffering an entire removal of the forests, and lead to a timely adoption of effective measures to prevent their destruction in this State. Our people have been duly warned of this danger, Bolander and other eminent botanists having called their attention to it years ago.

In explanation of the singular manner in which the larger sized *Sequoia* are occasionally formed, Dr. W. P. Gibbons first directed attention to the fact, that it has been found that three or four of these trees standing in proximity, have by the expansion of their growth been finally brought together and formed into one trunk. Since his suggestion of this method of growth numerous examples of it have been reported; among others, one occurring near Searsville, where several redwood trees have for a height of over forty feet grown together forming a single solid trunk. The only way to arrive at the age of such trees, is to count the number of rings indicating the annual growth from some single center. The oldest of these redwoods is about 1,500 years of age, much less than that of the *Sequoia Gigantea.* These redwoods are evidently the second generation of the race; therefore, it may be inferred that 3,000 years at least have passed since the present growth first commenced on the Coast Range. But long before this, vegetation must have covered portions of these hills, as the *Sequoia* reposes in a bed of alluvium from twenty to thirty feet in depth. The bulbous expansion of these trees near the base is composed of an enlargement of the roots growing together, and forming a complete net work. The height of this indicates the degree of denudation which the soil has undergone during the lifetime of the tree, being about five feet in 1,500 years. Around the base of each of these trees lie from 10,000 to 14,000 buds partially developed, possessing each the power, under favorable conditions, of being developed and forming a perfect tree. The mass of wood contained in a tree of this kind, twenty-five feet in diameter, is equal to 40,000 cubic feet, weighing over 2,500,000 pounds.

## CALIFORNIA PINES.

According to the classification of Prof. Bolander, the pines of California are divided into sixteen true species. There are twenty synonyms for these species, which have created some confusion as to their real name and number. The correct names of all, with the popular characteristics of the most striking, and their distribution, are herein given. The names marked thus (*) are those of trees having persistent cones, which they retain from ten to twenty years in some instances. Those marked thus (†) retain their cones but two years, while those to which this mark is attached (‡) throw off a series of cones every year. It is worthy of remark that all the conifers of the Pacific coast exhibit a symmetry and perfection of figure, as well as a healthfulness and vigor of growth, not attained by similar trees in any other part of the world.

*Pinus Insignis,** (Dougl.), well known as the Monterey Pine, and much cultivated in San Francisco. This tree covers many thousand acres in the vicinity of Monterey and Carmelo, forming quite a forest along the coast between these places : sixty to one hundred feet high, one to three feet in diameter; shape very irregular, often only a few rigid, much-spreading branches; foliage dense and of a vivid green color ; cones persistent, ten to nineteen whorls ; bark very thick and rimose. The streets of San Francisco, formerly planked with Oregon lumber, are now laid with the Monterey Pine, it being very resinous, and therefore standing the wear and tear better. It is also much used for bridges, floors, etc.

*P. Muricata,** (Don.)—Only species growing in the above vicinity, and which cannot be confounded with the *Insignis*. Singularly enough, it has many synonyms, the trees and cones being of great uniformity ; among the names by which it is known are the following : *P. Radiata*, *P. Sinclarii*, and *P. Tuberculata.*

*Pinus Tuberculata,** (Don.), Tuberculated Coned Pine.—This tree was first found by Dr. Coulter, south of Monterey, together with the *P. Insignis*, near the level of the sea and close to the beach. The foliage sparse and dull; rather bluish-green color; height from fifteen to thirty feet; diameter six to fourteen inches. Found also at Santa Cruz, Ukiah, Oakland hills, Forest Hill, and Eureka. The cones from the different localities are of great uniformity, but differ essentially from those of the *P. Insignis* of Monterey, though the two trees strongly resemble each other. Whorls of cones ten to twenty. Both species grow near the coast, but on different soil, the *P. Insignis* prefering a soil produced by the disintegration of a bituminous slate and granite ; while the other prefers a soil derived from metamorphosed sandstone. Should these two species be definitely united, after a thorough investigation, they would afford a striking example of the influence of different soils. It is singular to find such a well characterized form restricted to one locality, though this would not here prove an isolated fact, the *Abies Bractœata* being similarly confined to one locality in California. Isolation is in fact more or less a characteristic with all our trees, there being few countries where the influences of soil, climate, and exposition are so well and abruptly marked and unmistakably defined as in this.

*P. Contorta,** (Dougl. ?), Twisted Pine.—Head of Tomales Bay, Mendocino City, and foot-hills of the Sierra. Its manner of growth much resembles that of *P. Insignis.* It attains the same height, has the same irregular spreading branches, the same thick rimose bark and resinous wood. The leaves are invariably in pairs, and slightly silvery on the lower surface. The cones are scarcely two inches long.

*Pinus Ponderosa,* ‡ (Dougl.), the well known Yellow Pine, attains a height of two hundred and twenty-five feet or more, and a circumference of twenty-three or twenty-four feet. Its leaves grow in threes at the ends of the branches, presenting a peculiarly tufted appearance; their color dark yellowish-green; the bark of a light yellowish-brown, or cork color, is divided into large smooth plates from four to eight inches wide, and from twelve to twenty inches long, whereby the tree may be recognised at a distance. The Yellow Pine is found at Russian River Valley, south of Clear Lake Geysers, Auburn, Forest Hill, San José Valley, Blue Mountain, Rocky Mountains and New Mexico.

*Pinus Lambertiana,** (Dougl.), the well known Sugar Pine, or Long Coned Pine of Fremont, usually grows at great altitudes. The mature tree sometimes reaches a height of three hundred feet, and a diameter of ten or fifteen feet ; leaves are three inches long, dark bluish-green ; grows in groups of five ; foliage not dense ; cones large, sometimes eighteen inches long by four thick. The wood is similar to the White Pine (*Pinus Strobus*) of the Eastern States—white, soft, homogeneous, straight-grained, clear and free splitting ; it furnishes the best lumber in the State for "inside work" of houses, being the chief building material used in the Sierra Nevada, where it grows, and in adjacent sections. The tree derives its name from a sweet resinous gum which exudes from the duramen or hard wood portions. This substance in appearance, granulation and taste, resembles the manna of the drug stores, except by a slight terebinthine flavor. It is found only in small quantities, and has cathartic properties.

*Pinus Coulteri,*† Coulter's Pine.—Found on the eastern slope of the Coast Range in the Santa Lucia Mountains; not large; sometimes attains a height of seventy-five feet; knotty, highly ornamental; branches large and spreading; leaves a foot long, and pale sea-green in color. It is remarkable for having the largest cone of all the pines—seventeen inches in length, seven inches through, and shaped like a sugar-loaf.

*Pinus Sabiniana,*† (Dougl.)—This is the Nut Pine of the foot-hills, sometimes called the "Scrub Pine," "Silver Pine," or the "Digger Pine;" found on the lower slopes of both the Coast Range and Sierra Nevada, occupying the drier positions—leaves from four to ten inches long, grow in threes. The California Indians formerly gathered the nuts from its cone—they being with them a favorite article of food. The woodpecker selects them as store houses for its winter food, cutting holes in the bark and putting an acorn in each.

*Pinus Monticola,*‡ Mountain Pine.—A tall tree affording fine timber, harder than the Sugar Pine, and might be preferred, if its position near the summits of the Sierra did not make it difficult of access.

*Pinus Flexilis.*‡—This pine grows in the form of a low scrubby tree on windy heighths, so stout and thick that a man can stand on its top. In low altitudes it reaches a height of one hundred feet. It is useful only for firewood.

*Pinus Monophylla.*—This is a stinted, twisted tree; grows on the eastern slope of the Sierra, corresponding to the Nut Pine of the western slope. The cone is ill shaped and has an offensive odor, but yields a sweet nut. Spanish name: "piñon."

There are several species in the group of Coast Pines, viz: *P. Llavena,* east of San Diego; *P. Deflexa,* on the summit of California mountains; *P. Torreyana,* near San Diego; *P. Balfouriana*—this species is found near Scott's valley, in Northern California.

Five species of the above list, the *Insignis, Muricata, Llavenea, Delflexa,* and *Torreynna,* are peculiar to the sea coast. Five species, the *Contorta, Ponderosa, Lambertiana, Sabiniana,* and *Tuberculata,* are found both in the Coast Range and Sierra Nevada. The *Coulteri* is only found in the coast Range, eastern slope; the *Monticola* only high in the Sierra; the *Flexilis* only on the upper Sierra and lower slope of the same; and the *Monophylla* only on the eastern slope.

## OAKS.

*Quercus agrifolia,* (Nees.), California Live Oak.—Oakland, banks of Sacramento river, Clear Lake, Russian River valley, Anderson's valley, Monterey. Foliage extremely variable, the live oak exhibiting almost every conceivable size and form of oak leaf. On river banks and its localities near the coast, where it feels the influence of the daily fogs, this tree displays much uniformity. In the valleys of the interior the shapes of the leaves of one and the same tree differ materially. In Anderson's valley there are several trees, the entire foliage of which agrees well with Dr. Kellogg's *Q. morehus.* On dry gravelly hill-sides in the interior this tree presents still another form, *Q. Wislizeni* (Eng.) As it has the habit of growing in groups, one might suppose that trees of one group, at least, should show uniformity in botanical characters; yet this does not happen, the very extremes sometimes occurring in a single group. The acorns ripen annually, and differ also essentially in shape and size. Soil, climate, and exposition, offer in this case no satisfactory explanation for so great a variation in one species. It is no doubt justly referable to some intrinsic peculiarities. This tree makes excellent firewood, and is also used for certain mechanical purposes.

*Q. Garryana,* (Hook.), White Oak.—On dry easterly hill-sides and in valleys on a poor, buff-colored clay. Santa Rosa valley, Clear Lake, Searsville, Anderson's valley, San José valley. Exposition and soil agree in all these localities ; bark rather thin, whitish, and less coarsely rimose than any other of the California oaks. This wood possessing a fine grain, is much employed among farmers for making agricultural implements.

*Quercus fulvescens,* (Kellogg), Fulvous Oak, is a deciduous tree, grows about thirty feet high. The acorn, when young, is concealed in the cup, the two together resembling a little wheel ; the former, when mature, is an inch and a half long, and projects considerably beyond the cup. The wood is tougher than most of the oaks of California. Banks of Canoe creek.

*Quercus Kelloggii,* (Newb.), Kellogg's Oak.—Is a large deciduous tree, found only in California. Its leaves are deeply sinuate, with three principal lobes on each side, terminating in several acute points. It bears fruit only in alternate years, or at least most abundantly every other year. An idea prevails that the acorns give to swine a disease of the kidneys. Hills about San Francisco and Fort Reading.

*Q. Vaccinifolia,* the Huckleberry-leafed Oak, is a shrub from four to six feet high, which grows on the mountains in the northern part of the State. Its leaves in size and form resemble those of the huckleberry; the acorn is of the size and shape of a small hazel nut.

*Castanea Chrysophylla*, (Dougl.,) Golden-leafed Chestnut, or the Western Chinquapin.—On the Oakland hills this species is from three to six feet high; blooms early in July, like the Eastern *Castanea vesca*, and bears perfect fruit, edible and palatable. About Mendocino City it is a large tree, averaging from fifty to one hundred and twenty-five feet in height, and from two to three feet in diameter. On the Oakland hills it grows only on the outcropping of a white friable slate, destitute of all vegetable remains. On the Mendocino plains it grows on a cemented gravel, upon which the water rests for some months after the rainy season. The supply of an ærial moisture during the dry season is in favor of the Oakland hills, judging by the lichenose vegetation of the two localities.

*Q. hindsii*, (Benth), California White Oak, or Long Acorned Oak.—This is the characteristic oak of California; seldom reaches a greater height than sixty feet, and in its expansive branches is often wider than it is high—measuring sometimes one hundred and twenty-five feet from side to side. This tree furnishes no straight timber, and the wood is so soft and brittle as to be of little use except for burning. The acorns are large, sometimes two and a half inches long and formerly constituted the chief article of food of the Californian Indians.

*Q. Lobata*, (Neés.), Burr Oak.—The most common and largest Oak of California; found in all the valleys of the interior; never outside. It is a large and beautiful tree, this being the Oak, with its peculiar drooping branches, which imparts such a picturesque charm to the landscapes of California. It is specially noted for its long acorns, usually occurring in pairs. This oak presents about the longest trunk of all California foliaceous trees. The acorn of this species is also a favorite article of food with the aboriginal races. The wood ranks next to that of the *Q. Douglassii.*

*Q. Douglasii*, (Hook.), Pale Oak, Anderson Valley.—The general aspect and habit of this tree resemble very much those of *Quercus lobata*, with which it grows in the low flat portion of Anderson Valley. Its branchlets, however, are short, rigid and erect, while those of the *Quercus lobata* are most drooping. In the autumn, when laden with fruit, it presents a striking difference by having its rather pale acorns aggregated and clustered at the extremities of the branchlets. At a distance it strongly resembles a full-grown apple tree. It increases rapidly in number in Anderson Valley, from south to north, outnumbering almost every other oak at the lower end of the valley. Its wood ranks next to that of the *Q. Garryana.*

The three species last above mentioned, belonging to the section of White Oaks, are sufficiently unlike in external appearance to be distinguished at a distance—the farmer readily detecting the difference by the unequal qualities of the wood.

*Q. Sonomensis,* (Benth.), Black Oak.—Found at San Diego, Anderson Valley, Auburn, eastern and northern hill-sides in the Coast Ranges. It also occupies the more easterly situated flats, among the redwoods. Seldom found in the valleys; when occurring there they occupy that portion adjacent to the hill-sides, where there is generally a gravelly soil. In the fall it sheds its leaves, which become buff colored, before any other of the deciduous oaks. Wood is of a poor quality, being used only for fuel.

*Q. densiflora,* (Hook.), Chestnut Oak.—Along the Coast Range increases towards the north, from Santa Cruz to Mendocino City; occurs only in or near the redwoods. This tree attains a considerable height in dense woods, and is then but sparingly branched; leaves and acorns rather abundant; the wood is coarse-grained, wet and spongy when first cut, and hence, like the redwood, is by some termed Water Oak. The bark is very rich in tannin, and is extensively used for the curing of hides. The wood is extremely perishable.

*Q. Chrysolepis,* (Liebm.), Drooping Live Oak.—The most rare of all our oaks; it bears acorns but seldom and sparingly; found near Cloverdale, in Auburn Valley, and near Forest Hill; thirty to forty feet high, with a rather smooth whitish bark, and mostly long, slender, drooping branches—evergreen. The tree being rare, and occupying moist slopes along the gulches, is not often cut down.

## CEDARS.

*Libocedrus decurrens,* (Torr.), the California White Cedar.—This noble and hardy evergreen is reported on the Klamath mountains at five thousand feet elevation, and also on Scott river, in sandy soils, growing from forty to one hundred and forty feet high, and from five to seven feet in diameter. It is found also at Forest Hill, forming quite extensive forests there; Rancheria creek, Mendocino county; east of Salinas river, Monterey county; and east of San Diego. As the peculiar form of this tree is little known, it may be stated that the cones are very small, oblong oval, the feathery scales in opposite pairs, face to face—a few small abortive ones at the base; leaves awl-pointed—little scales, in opposite pairs, running down the twigs—as the specific name implies. The generic name signifies "incense cedar," on account of the fragrant odor it emits when burned.

*Cupressus fragrans*, the Fragrant Cedar.—This is found along the northern coast of the State. It is a large tree and produces a white, clear lumber, valuable for furniture, and inside work of houses. The wood has a strong, lasting, and not unpleasant odor.

*Cupressus Lawsoniana*, Lawson's Cedar.—This is a tree of little value.

*Cupressus macrocarpa*, (Hartn.), Monterey Cypress.—This is found at Cypress Point, Monterey—its principal locality; Tamalpais, at a height two thousand seven hundred feet; Mendocino City, and southeast of Clear Lake. This species seems to be very variable. At Cypress Point there is an extensive grove, containing mostly large trees of great beauty, and perfection; average height, from forty to sixty feet—circumference, nine to ten feet. At this point these trees are almost daily wrapped in a dense fog. Their branches are very compactly lapped, retaining the moisture to such an extent that the thick clusters of cones are quite mouldy. Between the cones and these little branchlets, a great deal of rubbish settles, which is often dripping wet. It is undoubtedly owing to this fact that so many seeds of this species collected there prove abortive.

## FIRS.

*Abies Douglasii*, (Lindl.) Red Fir, or Douglass Spruce.—This is, as remarked by Dr. Newberry, one of the grandest of the group of giants that form the forests of the West. This tree is generally of large size, attaining a height often of three hundred feet, and a diameter of ten feet. Wood strong, but coarse and uneaven in grain—the layers of each year's growth being soft on one side, and very hard on the other. The timber is much used for rough work in houses, and in ship-building. The tree grows in deep forests on the Sierra Nevada and Cascade mountains, from 35° to 49°, and near the coast, north of 39°.

*Picea, or Abies Bracteata*, (Don.), Leafy-coated Silver Fir, Santa Lucia Fir.—First discovered by Douglass on the mountains of the Columbia river; in Upper California, on the Santa Lucia mountains, at an elevation of about three thousand feet above the level of the sea. Leaves solitary, furrowed, alternate; bright, lively green above—two white silvery lines below. The branches are in whorls, slender and spreading—the lower ones drooping. Trunk very slender and perfectly straight; commonly clothed to the ground, although often naked on the lower third; two or three feet in diameter; one hundred and twenty feet high. This tree produces a rosin used by the Catholic priests as incense.

*Abies Williamsonii*, (Newb.), Yellow Fir, or Williamson's Spruce.—This tree bears a close resemblance to the Red Fir, and the two trees are usually found in company with each other.

*Abies Menziesii*, (Dougl.), Black Fir.—Smaller, and of little value.

*Picea grandis*, (Dougl.), White Fir, or Western Balsam Fir.—This Fir attains a height of one hundred and fifty feet, and a diameter of seven feet. The bark of the young trees contains numerous cysts full of the resinous fluid called the "balsam of fir."

## MISCELLANEOUS TREES.

*Torreya Californica*, (Torr.), California Nutmeg.—Found in the coast mountains near the bay of San Francisco; paper mill, Marin county; Ukiah, where there is quite a group; Mendocino City and Forest Hill. This graceful and beautiful evergeen grows from fifty to seventy-five feet high. The fruit is like a nutmeg in size and shape, but it has a disagreeable terebinthine taste, and is never used as a condiment; wood valuable.

*Taxus brevifolia*, (Nutt.), California Yew Tree.—This handsome tree is found at Devil's Cañon, near Forest Hill; twenty to thirty feet high, with extremely slender and drooping branches; dispersed but plentiful; wood valuable.

*Oreodaphne Californica*, (Nees.), California Laurel, or Bay.—Beautiful evergreen; very common in the coast valleys, where it grows to a height of fifty feet, with a trunk sometimes thirty inches in diameter. Leaves dark green, lustrous, four inches long, one inch wide, sharp at both ends, with smooth edges; foliage dense. The wood is grayish in color, very hard, durable, difficult to split, and bears a very high polish; used extensively as veneer; wood and leaves have an aromatic odor resembling Bay Rum; used as a condiment; odor causes some persons dizziness and headache.

*Arctostophylos Glauca*, (Lindl.), Manzanita.—Is a dense claret-colored shrub, growing as high as twelve feet, and nearly as broad as it is high, in the coast valleys, and in the Sierra Nevada, up near to the limit of perpetual snow; wood dense, hard, and dark red in color; bears a pinkish white blossom in clusters, which are replaced by round red berries about half an inch in diameter, of a pleasant, acidulous taste, being often eaten by the Indians and grizzly bears. The name means "little apple," from the Spanish, *Manza*. The wood is used for the manufacture of smoking pipes, etc.

*Arbutus Menziesii*, (Pursh.), Madrona.—This evergreen, one of the most striking trees of the California forest, acquires sometimes a height of fifty feet; diameter two feet; grows open, somewhat like the maple; leaves lustrous, bright green, oval in shape, three inches long, pea-green underneath, and dark-skinned above; bark of a bright red—smooth, and peels off at regular seasons. The new bark is of a pea-green; wood very hard, and employed to some extent in the arts, especially for making the wooden stirrups commonly used in this State. The tree bears a bright red berry, in clusters of which the birds are found.

*Æsculus Californica*, (Nutt.), the Californian Horse-Chestnut, or Buckeye.—Abundant in the Sacramento, San Joaquin, and coast valleys; a low-spreading tree, or shrub; grows about rocky ledges, in ravines, and on the banks of streams; rarely exceeds fifteen feet in height; has a hemispherical shape, very dense foliage, rising from the ground in a globular form; five leaves grow together on one stem; is among the first to open of the deciduous trees of California. This tree bears heavy clusters of fragrant blossoms from early spring till late in the summer. The fruit is large and abundant, and is still used as an article of food by such California Indians as depend upon wild fruits and game for their subsistence.

## SHRUBS AND PLANTS.

Among the various trees and shrubs found in California, is the Cœanothus, commonly called Wild, or California Lilac, of which there are many species. It is a beautiful evergreen shrub, growing about ten feet high; has a dense foliage, produces a multitude of little twigs, and may be trimmed into almost any shape. On these trees is found the California silk-worm (*Saturnia Californica*).

*Rhus toxicodendron*, the Poison Oak, grows abundantly in the Sacramento basin and along the coast. If it can attach itself to an oak tree, it becomes a parasite vine, and attains a thickness, though very rarely, of four inches in the trunk, and climbs to a height of forty feet. To some persons the touch of the leaf is poisonous, causing an irritating eruption of the skin; its effect is sometimes felt even by passing to the leeward of the bush on a windy day, or going through the smoke of a fire in which it is burning.

The Willow and Cottonwood of California differ little in appearance from those of the Mississippi valley.

*Rhamnus Purschianus, D. C.*, Pursh's Alder, Buckthorn, is found growing at Eureka, to a height of from thirty to forty feet, and about one foot in diameter. The wood is of a bright, beautiful yellow color, like boxwood, or fustic. The timber is said to be firm, straight-grained and fine for cabinet makers, taking a remarkably fine polish.

*Alnus Oregona*, (Nutt.), Oregon Alder.—The cognomen *alder* is associated in the public mind with some sort of bush or shrub ; but the species of this coast, designated as Oregon Alder, is a handsome, upright tree, from two to four feet in diameter, and from forty to eighty feet high. This tree is distributed chiefly throughout middle and northern California and Oregon, growing always along the banks of living streams. The wood does not split readily, as the woven fibers render it tough. It is neither hard nor very durable, but takes a smooth, delicate polish ; makes good gun-powder charcoal, the bark being used for tanning. In times of scarcity the leaves afford good fodder for sheep.

*Berberis Herbosa*, (Pursh.), *Mahonia glumacœa*, Barberry, or False Oregon Grape.—A low sub-shrub, found in piney woods along the coast, northward into Oregon. Berries deep-blue, in clusters somewhat resembling frost-grapes, hence the name ; flavor strongly acid, but eatable, and used for making pies, tarts, etc.

*Ephedra*, Joint Fir, Tar-weed.—Found on the river bars in the interior ; used as a tea for medicinal purposes ; has a long, slender pointed leaf, resembling that of the pine.

The Wild Cherry and Plum of California grow on bushes, the fruit resembling the cultivated, except that it is smaller and of inferior flavor.

*Lewisia rediviva*, White Lewisia ; Indian name, *Spatulum.*—Root large; fusiform; outer portion dingy—inner snowy white and farinaceous beautiful white flowers closing up early in the afternoon; roots eaten by Indians; abound in concentrated nutriment—a single ounce of the dried sufficing for a meal ; found in the State of Nevada—scarlet variety in Tulare county, California; possesses great prospective value as an edible root, since it could, no doubt, be easily grown in almost any soil, and would greatly improve in size and flavor with cultivation.

*Actœa rubra*, Red Baneberry.—Stem two to three feet high ; sends up in the spring one or more large compound leaves ; flowers in April and May ; oblong, egg-shaped, shining red berries ; ripen in July and August ; both root and berries poisonous ; reputed medicinal.

*Sarracenia purpurea*, Pitcher Plant.—Found a few miles south of Mt. Shasta, along the marshy banks of a small creek; flower-stem two to four feet high; flowers pale-purple, two inches across; bloom in

May; leaves contorted, and about three feet long; flowers pitcher-shaped, the California species differing from those elsewhere in having the opening on the under side; hence, it contains less water—only such moisture as it gathers from evaporation or its own secretions. The throat of the orifice exudes a sweetish substance attractive to flies and other insects, which having entered it are unable to escape, owing to the inside of the flower being set with slender hairs pointing downwards, like the wires in a mouse-trap. In this manner the flower becomes often half filled with the fœtid accumulations of these decaying insects. It is considered both a preventive and sovereign cure for small pox, the Indians having the greatest confidence in its virtues as such. It is considered a valuable addition to the Materia Medica.

*Arnica mollis,* Soft Arnica.—Found along mountain rivulets and ravines; in the redwood lands, and along the coast. Plant from two to three feet high, pale green color, clothed with soft, fine glutinous hair; has a bitterish taste, resembling that of the dandelion root—but more balsamic and biting; exhales an odor slightly like that of the apple blossom. Abounds in strychnine, and is, therefore, useful in all diseases where that substance is indicated. The tincture is also used for bruises, sprains, etc. Though its salts, when extracted, are a deadly poison, rabbits and other wild animals feed on it greedily, and with impunity.

*Silene Scoulari,* the Catchfly.—Plant from two to three feet high. Flowers—light lively red above, paler beneath. Stalk, except lower part, covered with velvety, viscid glandular hairs, to which flies and other insects adhere when lighting upon them—whence the name. Leaves—five to eight inches long, and one inch and a quarter wide.

*Linum decurrens,* and *L. trisepalum,* California Flaxworts.—There are several species of wild flax in California, two or three of which are found growing on the hills about San Francisco. The most common kind, the *L. Californicum,* is an annual herb, about one foot in height, much branched, with few leaves below; flowers, whitish, or slightly pink-tinged; found in Sacramento valley, back of Oakland, and in many other places. Several bales of this plant were collected near Marysville a few years ago, and sent to San Francisco under the supposition that it was "canchalagua," the popular fever and ague remedy, with which it really does possess many properties in common. One species of this wild flax bears large blue flowers; another, yellow flowers in May and June.

*Conyza Saliciflora,* Willow-leaf Flea-bane.—Abounds in salt and fresh water marshes, and in shallow upland ponds ; perennial ; evergreen—blooming from September to April ; from six to ten feet high, resembling a willow at a distance. Leaves—lancelate ; seeds—rough and silky ; plant and leaves, when bruised, emit an unpleasant odor, something like a mixture of camphor and bitter-weed. It is employed to make flea powders, also useful for dispersing gnats—hence the name.

*Hierochloa fragrans*, fragrant, variable Grass.—Found on banks of Paper Mill Creek, Marin county, growing in tufts ; blooming about first of April, (Bolander) ; also grows on old logs, and in forks of low trees ; grass two to three feet high ; slightly rough ; roots perennial, creeping ; leaves six to fourteen inches long, one quarter to three quarters inch wide, long pointed, rough, and bright green color ; is used in this country for scenting clothes ; in some parts of Europe is strewn before the church-doors on festival days.

*Marrah.*—Two species in California, one also on Cerros Island, coast of Lower California ; purgative and tonic—used in early settlement of the State as a substitute for quinine.

*Rahmus.*—Shrub four to six feet high ; wood hard and fine grained. Native Californians extracted from it an alkaline salt, much used as a tonic. Grows in barren, stony grounds.

*Sarcodes Sanguinea*, California Snow-Plant.—Found growing near the edges of, and even in the snow, along the sides of the Sierra. Specimens found by Kellogg, opposite Sitka. Is a parasite, growing from decayed wood on the soil ; abounds with gallic acid.

*Chlorogalum pomeridianum*, (Kunth.), the Soap Plant of California—Amole.—The bulbous root contains a large quantity of *saponine*, and when rubbed in water makes a lather like soap, and is good for removing dirt. It was extensively used by the Indians and Spanish Californians previous to the American conquest. The Amole has a stalk four or five feet high, from which branches about eighteen inches long spring out. The branches are covered with buds, which open in the night, beginning at the root of the boughs, about four inches of a branch opening at a time. The next night the buds of another four inches open, and so on. Is found from the upper Sacramento valley to Monterey.

Strawberries, Blackberries, Currants, Raspberries, and Salmonberries are all indigenous, and in a few localities abundant, though inferior in size, and the most of them also in flavor.

### GRASSES.

While the grasses of California are numerous in variety, and the most of them valuable for pasturage, few are well adapted for making hay; wherefore, it may yet become necessary to import foreign varieties for meeting this want, provided such can be found suited to our peculiar climate. It may be easy to find grasses adapted to those portions of the State situated within the foggy regions along the coast, especially west of the redwoods. But to find those that will survive the long dry summers in the interior valleys, and on the foot-hills, will be difficult, if not impracticable.

*Avena fatua*, (Linn.), the Wild Oat.—Among the indigenous nutritious grasses, this is the best yet found for making fodder, save the cereals sown expressly for the purpose. The Wild Oat, in the year 1835, was found only south of the Bay of San Francisco; but about that time, when the whites began to cross frequently from the southern to the northern side of the bay, this grain being sown in a natural way by horses and cattle, spread rapidly over the Sacramento valley and the coast region, its range now being very extensive. It grows luxuriantly, surpassing in some localities the cultivated grain both in height, size and abundance of stalks.

Lately the Wild Oat has been eaten down so closely by cattle, that in many places it has been killed out, and is fast disappearing in California on account of the country having been overstocked. This grain is propagated not by the roots, but by the seeds, many of which fall into cracks in the earth, opening in every direction during the dry season, where they lie in safety until the rains come, when the ground closes up and the grain sprouts. The position of these cracks of one year may often be traced the next season by the stalks of the grain. The Wild Oat grows both on the hills and plains. The berry is so much shrunken that it is never threshed like other grain.

*Atropis Californica*, (Manro), Squirrel Grass.—"Comes in after the Wild Oats have become exterminated by close feeding. Foliage of no value," (Prof. Brewer). Very common throughout the State; perennial; March and April.

Quite late in the season (July and August) the dry hills are covered with another species of grass, the *Gastridium Australia*, (Beauv.), or *Milium lendigerum*, (Linn.) San José, in November. This has not before been noticed as a North America plant. Steudel states that it has been found in Chili. It is one of those few annual gregarious grasses that cover our hills. Many consider it an introduced species, but its general distribution over the State, its character, with the fact that it is a native of the countries of the Mediterranean (with which we have so many plants in common, especially of the lower orders), favor the presumption of its being an indigenous plant. Indefinite opinion regarding its value.

On the Oakland hills, and in San Francisco, on north hill-sides, and in swamps, a species of coarse salt grass is found, *Calamagrostis alentica*, (Trin.), forming large tufts; leaves very long and wide; generally breaking off a little above the sheaths. During winter, when feed is scarce, it is eaten by cattle. June; perennial.

The *Aira danthonioides* (Trin,), is found in moist meadows, forming often a large bulk of the grass. Oakland. In some localities it occurs sparingly; common in the Russian River valley; yields but little hay. April; annual.

*Arrhenatherum avenaceum*, (Beauv.), Oat Grass.—Observed in a cultivated field at Mendocino City, where it had been sown with *Holcus lanatus*, both grasses looking remarkably well. In Germany it is known under the name of "French rag grass." The roots are stoloniferous; perennial, and spread rapidly; the culms attain a height of from three to five feet; leaves plentiful and large. It yields a good deal of hay in dry, fertile soils.

*Poa pratensis*, (Linn.), Green Meadow Grass.—Meadows at Oakland, sparingly; roots stoloniferous; perennial; April. Thrives best on rather dry meadows.

On drifting sand-hills west of San Francisco, and near Bolinas Bay, grows a low, beautiful, diœcious perennial grass, *Brizopyrum Douglasii*, (Hook.), with extremely long runners, adapted to confining the loose sand and preventing it drifting further inland. April. As a fodder grass, useless.

Another species of *Brizopyrum spicatum*, (Hook.), Spike Grass, grows in the salt marshes near the bay of San Francisco, and upon saline soils in the interior. Useless for agricultural purposes. April.

In the wet and swampy places near San Francisco, in April, we find the *Glyceria pauciflora*, (Presl.), also seemingly useless.

At Oakland, Santa Rosa valley, Ukiah, and in wet meadows, grows a handsome and tender species of grass, of which horses and cattle are fond, *Lophochlæna Californica*, (Nees.) Is not capable of resisting heavy winds when grown alone. Mixed with other grasses, however, it would do most excellent. This is probably the only uncontested indigenous grass of California, deserving especial attention. Gregarious in manner of growth; annual—April.

The *Kœleria Cristata*, (Pers.)—Readily eaten by cattle, though not the best of fodder grasses. Perennial—April. Found on dry hills—Oakland, San Francisco, Cloverdale.

*Festuca Scabrella,* (Torr.), Bunch-grass.—North hillsides and lightly shaded woods—the less shaded, the larger the tufts grow. Blades long, and break off just above the sheaths. During the winter cattle are fond of it, eating off the tufts as closely as possible. Very abundant along the shady hill sides of the Coast Range. April—perennial.

*Festuca ovina,* (Linn.), Sheep's Fescue Grass.—Dispersed sparingly. Found on Oakland hills. Gives but a small bulk, but forms a nutritious food. April—perennial.

*Festuca pratensis,* (Hends.), Meadow Fescue Grass.—This grass yields a large bulk of hay of superior quality ; thrives well in dry and wet meadows, if the soil is fertile. Found at Tomales Bay. April—perennial.

*Lolium perenne,* (Linn.), Ray, or Rye Grass.—Found always near dwellings, quite sparingly. April, May—perennial.

*Lolium tremulentum,* (Linn.), Bearded Darnel.—Very common among grain; found at Oakland, and in other parts of the State. Grains of this grass are considered to be noxious, and poisonous to men and beasts. Haller affirms that this species of *lolium* not only produces intoxication, as its specific name implies, but that if baked into bread or fermented in ale, its administration produces headache, vertigo, vomiting, lethargy, drunkenness, and difficulty of speech—causing a trembling of the tongue, and even fatal effects. By the Chinese laws, for this plant is found both in China and Japan, it is forbidden to be used in fermented liquors. According to Withering, horses are killed by it, and dogs are particularly subject to its influences, when mixed in small quantities with their food. It is, however, said to fatten chickens and hogs.

*Hordeum pratensee,* (Huds.), Wild Barley.—Quite common in many meadows ; in some it makes up a considerable portion of the bulk of grass growing. April, May.

*Hordeum murinum,* (Linn.), Wall Barley.—For roads and lots; found at Spring valley; Mission Dolores. If allowed to insinuate itself into meadows it injures the hay and lessens the value of the crops. Its strong beards (arms) hurt the mouths of horses.

Among the second species of nutritious herbs indigenous to California, and valuable to our herdsmen, is the Alfilerilla, *Erodium cicutarium,* (L'Herit). It is succulent, sweet, hardy, bearing clusters of spikes or pins an inch and a half long. These spikes have given it the name of Pin Grass; and the resemblance of its leaves to the geranium has suggested the name of "Wild Geranium." It has a large root, which it sends deep into the ground, thus enabling it to resist the drought, while above the surface it puts forth a dense mass of stalks and leaves, spreading sometimes several feet in every direction. Cattle prefer it to every other indigenous herb of the State.

California possesses also several species of clover, especially the White California Clover, having a large yellowish-white bloom ; grows very large, sometimes two feet high, in moist, favorable situations ; while in dry places it will also mature its seeds without rising more than two or three inches above the ground. It is very sweet, and is often eaten by the Indians, who like it both raw and boiled. Cattle also are extremely fond of it.

The "Burr Clover," so named from a spherical burr, about a quarter of an inch in diameter, which it bears in clusters of three. It is found in all the settled parts of the State. Cattle do not like it when green, but after it dries the burrs fall upon the ground and are picked up by the cattle.

*Phaca Nuttalii*, (Tor. and Gray), the Indian Pea, or Pop-pea, called sometimes Bladder-pea, or Rattle-weed, a cause of serious injury to wool. In close cropped fields, where horses and cattle are pinched for hunger, it is sometimes eaten, and is apt to prove fatal. This plant is a pest of high dry pastures, those presumed to be best adapted for sheep grazing. The symptoms are a peculiar infatuation, or intoxication, under the effects of which the animal becomes stupid, and finally pines away and dies.

The variety and abundance of wild flowers in California are large, each month having its special growth. In the valleys of the coast mountains is found the *Yerba buena*, Spanish for "good herb," a creeping vine, bearing some resemblance in its leaves and vine to the wild strawberry. It has a strong perfume, between peppermint and camphor, and possesses valuable medicinal properties.

*Erythræa Muthbenbergii*, (Griesb.), "Canchalagua."—Is a native of California; grows plentifully on the low grounds bordering Suisun Bay, for which high medicinal virtues are claimed; the flowers are rose-red, numerous and very pretty, in April and May.

*Daucus pusillus*, (Michn.), the "Yerba de la vibora," (Spanish for rattlesnake).—This plant resembles somewhat the Wild Carrot, and has some reputation among the native Californians as a remedy for the bite of venomous serpents, but its efficacy is very doubtful.

Of the properties and practical uses of the Flora Medica of California but little is yet known, and it might be well for our physicians and pharmacutists to make more careful examination into this department of botanical science.

### FLOWERING PLANTS AND SHRUBS.

These are wide spread and numerous in California, the purely native all differing from the same species in other countries. Several varieties of the wild rose grow here, none of which have corresponding types elsewhere. A number of species, identical with those of foreign lands, are found growing wild, and apparently indigenous in this State, which were originally, no doubt, introduced from abroad. So numerous are these flowers in their season, as to form a marked feature, not only in the botany, but also in the landscape scenery of California. In the spring of the year, the time for most of them to bloom, they cover not only the plains and foot-hills, but grow in many places to the very tops of the mountains. The forests are nearly everywhere filled with them, and even the arid prairies and deserts are often adorned by their presence. The different classes and genera do not usually intermix, but grow segregated in patches, some of which cover acres, and sometimes even square miles of space. Nothing can be more gorgeous than these vast fields of wild flowers, when arrived at full perfection. In the months of April and May, the whole country decked with its floral jewelry, set in the deep-hued verdure, presents a picture not easily found outside of California. But it is a noticeable feature of the flowers of this coast, that while they possess remarkable elegance of form, as well as variety and brilliancy of color, they are as a general thing deficient in odor. A few of them possess this property in a high degree, the *cœanothus*, and some other classes, filling the air when in bloom with their fragrance. How far, if at all, cultivation will aid in developing in them the odoriferous property, has not been fully established by practical tests, though it will probably tend to supply this defect, at least in some cases. That this lack of odor is, however, inherent in the plant and not the result of soil, climate, or other accident, is shown by the fact that imported flowers grown here do not loose the perfume natural to them elsewhere.

Among the more beautiful and fragrant flowers found in California, the Lily and Syringa family are conspicuous; some of the latter forming large trees; which, when in bloom, are so completely enveloped with cone-like clusters as to suggest the presence of small white clouds resting on the verge of the horizon. These flowers, emiting the pleasant odor peculiar to their kind, fill the air for a long way around with the most delicious perfume; and although the wild flowers of California are so generally inodorous, the atmosphere, owing to their incredible numbers, and the fact that a few are highly fragrant, is fairly oppressed with the rich aroma thrown off by them in the spring and early summer.

### CRYPTOGAMIA—FLOWERLESS PLANTS.

This class is noticeable for its numbers and variety; already over one hundred species of mosses having been described. Some of these mosses, drooping from the forest trees, add much to the beauty and picturesqueness of the scenery in many of the interior valleys of the State. Any reference to these more simple and lowly products of the vegetable world is apt to suggest in the popular mind the idea of inutility and worthlessness; yet, many individuals of this class attain great size, such as the ferns and sea-weeds, the former where humidity, heat and shade are present to favor their growth, sometimes attaining a height of forty feet or more; while the latter, especially on the northern coast, often grow to a prodigious length. In the harbor of Victoria, and in the bays around the island of Vancouver, the Algæ often reach a length of a hundred feet or more, covering the bottom so completely as to hide it from sight, and swaying in the most graceful manner with the tide.

*Polyporus*, Fungi or Mush-rooms.—The largest species found in California is the "Touchwood, or Hard Tinder," of a semi-circular shape, between one and two feet across, and from six to eight inches long; found generally on the trunk of the Laurel Tree. The common small species, with variegated, concentric rings (*P. Versicolor*), is used to lure insects for examination with the microscope. We find also, generally in meadows and after a rainy night, large quantities of the *Agaricus Compestris*, or "Edible Mushroom." As mushrooms vary in quality with climate, meteoric conditions, soils, etc., the safest way is to eat only those raised in gardens.

*Lichens.*—The barks of most of our trees are covered with several varieties of lichens, characteristic of the species, the *Evernia Vulpina*, (Ach.), being found on the bark of our mammoth trees.

Among the parasitic fungi we find the white and black Mildew, (*Puccinia* and *Antennaria*), which ruins wheat fields in the north, and orange orchards in the south. Rust, or red mildew, (*Uredo rubigo*), which, however, is not so injurious as some others. Smut, (*Uredo segetum*). Bunt, (*Uredo caries*), where the grain looks well, but is a mass of black *sporidia* when crushed. The ergot of grasses, but chiefly of rye, better known as "spurred rye," is poisonous in its effects.

## CATALOGUE OF THE NATIVE TREES OF CALIFORNIA.

| Botanical Name. | Popular Name. | Height. Feet. | Locality. |
|---|---|---|---|
| SEQUOIA— | | | |
| Gigantea, (Endl.) Syn.: Wellingtonia Gigantea, (Lind.); Sequoia Wellingtonia, (Seem.); Sequoia Gigantea, (Torr.); Taxodium Giganteum, (Kellogg & Behr.) | Redwood; Califor'a Giant; Calif. Mammoth Tree; California Big Tree. | 450 | Tuolumne, Mariposa, Tulare and Calaveras counties. |
| Sempervirens, (Lamb). Syn.: Taxodium Sempervirens, (Lamb); Abies Religiosa, (Schlecht's Chamys.) | California Redwood | 300 | Coast; Latitude 36° to 40.° |
| TAXUS— | | | |
| Brevifolia, (Nutt.) | Western Yew | 75 | Downieville. |
| TORREYA— | | | |
| Californica, (Torr.); Myristica, (Hook.) | Wild Nutmeg | 75 | Latitude 39°, California. |
| LILHREÆ— | | | |
| Laurina, (Walp.); Rhus Laurina, (Nutt.) | | 20 | Santa Barbara. |
| OLNEYA TESOTA, (Gray.) | Iron wood | 20 | San Pedro to Fort Yuma. |
| PARKINSONIA— | Greenwood. | | |
| Microphylla, (Torr.) | Small leaved | 15 | |
| Aculeata. (Linn.) | Prickly | | Fort Yuma. |
| CERCIDIUM FLORIDIUM, (Benth.) | Green Acacia | 30 | San Pedro to Colorado river. |
| ADENOSTOMA— | | | |
| Fasciculata, (Hook.) | | | Near San Diego. |
| Sparsifolia, (Torr.) | | 30 | San Diego. |
| DALEA— | | | |
| Spinosa, (Gray.) | | 15 | Colorado river. |
| STYPHONIA— | | | |
| Integrifolia, (Nutt.) | | 20 | San Diego. |
| Serrata | | | Santa Barbara. |
| ACACIA— | | | |
| Greggii, (Gray.) | | 20 | Burro mountains. |
| Constricta, (Benth.) | | | San Pedro, (tributary Gila.) |
| Cuspidata, (Schlecht.) | | | San Pedro river. |
| Farnesiana, (Willd); Cavena, (Hook.) | | 30 | Laredo to Pecos river. |
| ECHINOCACTUS— | | | |
| Cylindraceus | | | Colorado river. |
| Wislizeni | | 20 ? | El Paso. |
| DIOSPYROS— | Persimmon | | |
| Texana, (Scheele.) | Japote | 15 | San Pedro river. |
| CHILOPSIS— | | | |
| Linearis, (D. C.) | | 25 | San Felipe. |
| YUCCA— | | | |
| Baccata, (Torr.) | Fruit-bearing Yucca | 25 | Southern California. |
| Draconis, (Linn.); Ver. Arborescens | | 30 | West of the Colorado river. |
| Aloifolia | | 15 | Sierra Nevada. |
| SAPINDACEŒ— | | | |
| Æsculus Californica, (Nutt.) | Buckeye; Cal. Chestnut | 40 | Interior of the State. |
| LAREYANA MEXICANA, (Moric.) | Hediondo | 15 | Gulf of California. |
| PISTACEA MEXICANA, (H. B. K.) | Mexican Pistachia | 20 | Texas to San Diego, Cal. |
| ORNUS DIPETALA, (Hook.) | Flowering Ash | 20 | California. |
| ALNUS— | | | |
| Oregana, (Nutt.) | Oregon Alder | 50 | Northern California. |
| Viridis, (D. C.) | Green Alder | | Cajon Pass. |
| POPULUS— | | | |
| Trichocarpa, (Torr.) | Hairy-pod Poplar | | Los Angeles. |
| Monolifera, (Ait.) | Cottonwood | 70 | Sacramento river. |
| Tremoloides, (Michx.) | Quaking Aspen | 50 | Sierra Nevada. |
| FRAXINUS OREGANA, (Nutt.) | Oregon Ash | 40 | Upper Sacramento valley. |
| ACROSTAPHYLOS GLAUCUS—(Lindl.) | Manzenita | 10 | California mountains. |
| ARBUTUS MENZIESII—(Pursh.) | Madrona | 30 | Sacramento valley. |
| OREODAPHNE CALIFORNICA, (Nees.) | California Laurel | 70 | Oakland; near San Gabriel. |
| CASTANEA CHRYSOPHYLLA. (Dougl.) | Western Chinquapin | 50 | Mendocino City. |
| QUERCUS— | | | |
| Acutidens, (Torr.) | Sharptoothed Oak | 20 | San Luis Rey. |
| Agrifolia, (Nees; Nutt.) | Scrub or Evergreen Oak. | 40 | Sacramento valley. |
| Fulvescens, (Kellogg.) | Fulvous Oak | 30 | Southern coast. |
| Kelloggii, (Newb.) | Kellogg's Oak | 30 | Coast of Cal.; San Francisco. |
| Hindsii, (Benth.) | Long-acorned Oak | 60 | Slopes of foothills. |
| Densiflora, (Hook.) | Chestnut Oak | 20 | Santa Cruz mountains. |
| Garryana, (Hook.) | White Oak | 30 | Santa Rosa valley. |
| Douglassii, (Hook.) | Pale Oak | 20 | Clear Lake. |
| Lobata, (Nees.) | Burr Oak | | Valleys of California. |
| Sonomensis, (Benth.) | Black Oak | 30 | San Diego; Auburn. |
| Chrysolepis, (Liebm.) | Drooping Live Oak | 40 | Forest Hill. |
| Vaccinifolia | Huckleberry Oak | 6 | Northern California. |
| THUYA— | | | |
| Plicata, (Nees.) | Arborvitæ | 300 | San Diego mountains. |
| Gigantea, (Nutt.) | Oregon White Cedar | 100 | San Diego mountains. |
| PLATANUS RACEMOSA, (Nutt.) | Mexican Sycamore | 80 | Feather river. |

## Catalogue of Native Trees of California—Continued.

| Botanical Name. | Popular Name. | Height. Feet. | Locality. |
|---|---|---|---|
| Picea Grandis, (Dougl.) | Western Balsam Fir | 150 | Sonora, California. |
| Abies— | | | |
| Douglasii, (Lindl.) | Douglas' Spruce | 300 | Sierra Nevada. |
| Menziesii, (Dougl.) | Black Fir | 70 | Sierra Nevada. |
| Taxifolia, (Lamb.) | White Spruce | 70 | San Francisco. |
| Amabilis, (Dougl.) | Oregon Silver Fir | 100 | California. |
| Bracheata | Santa Lucia Fir | 100 | Santa Lucia mountains. |
| Williamsonii, (Newb.) | Williamson's Spruce | 100 | |
| Libocedrus Decurrens, (Torr.) | California White Cedar | 140 | Northern California. |
| Juniperus— | | | |
| Occidentalis | Utah Cedar | 30 | California. |
| Pachyploea, (Torr.) | Thick-barked J. | | Monterey. |
| Tetragona, (Schlecth.) | Square-leaved J. | 15 | San Felipe. |
| Cupressus— | | | |
| Macrocarpa, (Hartn.) | Long-fruit Cypress | 60 | Monterey to San Diego. |
| Lawsoniana | California Cypress | | Monterey. |
| Goveniana, (Gordon.) | | 15 | San Diego mountains. |
| Fragrans | Fragrant Cedar | 50 | Northern coast. |
| Pinus— | | | |
| Lambertiana, (Dougl.) | Sugar Pine | 300 | Northern California. |
| Sabiniana, (Dougl.) | Sabine's Pine | 140 | Mt.Diablo; east of San Diego. |
| Ponderosa, (Dougl.) | Yellow Pine | 225 | Russian River valley. |
| Insignis, (Dougl.) | Monterey Pine | 100 | Carmelo valley; Monterey. |
| Tuberculata, (Don.) | | 30 | Forest Hill; Santa Cruz. |
| Muricata, (Don.) | | 15 | Monterey; Mendocino City. |
| Contorta, (Dougl.; Loud.) | Twisted Pine | 60 | Tomales bay; Mendocino. |
| Murryana, (Balf.) | Murray's Pine | 40 | Siskiyou mountains. |
| Coulteri | Coulter's Pine | 70 | Santa Lucia mountains. |
| Torreyana, (Parry.) | Torrey's Pine | 50 | San Diego. |
| Deflexa, (Torr.) | Claw Scaled Pine | 50 | Cajon Pass. |
| Flexilis, (James.) | Rocky Mt. White Pine | 50 | San Francisco mts, N. M. |
| Monophylla, (Torr.) | One-leaved Nut Pine | 60 | Carson's Pass, Cal. |
| Llavenana, (Scheid.) | Rocky White Pine | 50 | San Diego mountains. |
| Balfouriana | | | Scott's valley. |
| Juglans Rupestris, (Engelm.) | Walnut | 60 | Los Angeles. |
| Salix— | | | |
| Brachystachys, (Benth.) | Willow | 40 | Monterey. |
| Lasiolepis, (Benth.) | Holly-sealed | 25 | California. |
| Cornus— | | | |
| Pubescens, (Nutt.) | Green Cornel | 20 | Duffield's ranch; San Diego. |
| Nuttallii, (Aud.) | Oregon Dogwood | 60 | Duffield's ranch; Monterey. |
| Sessilis, (Torr.) | California Dogwood | 15 | Grass Valley. |
| Pyrus Rivularis | Oregon Crab Apple | 40 | Santa Rosa creek. |
| Photinia Arbutifolia, (Lindl.) | | 20 | Monterey; San Diego. |
| Frangula Californica, (Gray.) | California Buckthorn | 15 | California. |
| Cercis Occidentalis, (Torr.) | California Redbud | | Sacramento river. |
| Cæanothus— | | | |
| Thyrsiflorus, (Esch.) | Cœanothus; Wild Lilac | 10 | San Francisco. |
| Toredlacus, (Hook.) | do do | 6 | Grass Valley. |
| Cuneatus, (Nutt.) | do do | | Cocomongo. |
| Integerrimus, (Hook.) | do do | | Los Angeles. |
| Prostatus, (Benth.) | do do | | Grass Valley. |
| Cerasus— | | | |
| Ilicifolia, (Nutt.) | Wooly-leaved Cherry | | Santa Barbara. |
| Demissa, (Nutt.) | Shrubby Cherry | 20 | Sonora. |
| Prunus— | | | |
| Subcordata, (Benth.) | California Plum | 6 | Yuba river. |
| Vitis, (Linn.)— | | | |
| Californica, (Benth.) | California Grapevine | | Fort Reading; San Diego. |
| Acer— | | | |
| Macrophyllum, (Pursh.) | White Maple | 90 | Santa Barbara. |
| Circinatum, (Pursh.) | Round-leaved; Vine Maple | 40 | Mountains of California. |
| Negundo— | | | |
| Californicum, (H. Kr.) | California Box Elder | 30 | California. |

# CHAPTER IX.

## MINING AND METALLURGICAL PROCESSES.

Gold—Placer Mining—The Shallow Placers—River Mining—The Deep Placers—Tunnel Mining—Hydraulic Mining—Blue Gravel—The Great Blue Lead—White Cement—Quartz, or Vein Mining—Mining Operations—Milling Machinery and Processes—The Grass Valley System of Amalgamation—Amalgamation in Battery—The Mariposa Process—Concentration—Plattner's Chlorination Process.

Although California is by no means wanting in the variety of its metallic ores, yet the number of different metals which, either in the native state, or mineralized as ores, have hitherto been made the object of successful and profitable exploitation, is comparatively small, comprising only gold, mercury, copper, and silver. Platinum and iridosmine are also incidentally obtained in small quantities, associated with placer gold. Deposits of lead ore have been found, but as yet are undeveloped. Iron ores of very superior quality have been discovered at several localities in great quantity. Some of these deposits are in many respects favorably situated, and although their distance from market, and the high prices of labor, transportation, etc., have so far prevented their being advantageously worked, yet, with additional railroad facilities, and the introduction of cheaper labor, this useful metal will no doubt shortly be produced in California in ample supply for all home demands.

Among other metallic ores known to exist within the State, and which possess a greater or less prospective commercial value, are zinc, chromium, manganese, nickel, cobalt, arsenic, antimony, and tin.

Of the non-metallic mineral products already contributing to the wealth of the State, the coal of the Monte Diablo mines is of primary importance. Next to this is the borax of Clear Lake, to which may be added native sulphur, and common salt, obtained in considerable quantities—the latter, as yet, chiefly from the evaporation of sea water, although extensive deposits of it exist in the solid form at various localities in the interior of the State. Asphaltum also, a product of the southern counties, is used extensively for paving and roofing purposes. Many other mineral substances occurring in California will become of value for various manufacturing and commercial purposes in the future, some of them even now being turned to profitable account.

Though silver has been included in the list of its metallic products, California can by no means be called a silver producing State—the greater part of that shipped from San Francisco being furnished by the mines of the State of Nevada. True, silver mines are not uncommon in the southeastern part of the State, and some of them contain very rich ores. This is especially the case in Alpine, Mono and Inyo counties, lying east of the Sierras. Many attempts have been made to mine and work these ores; but the veins are usually small, and mining operations in these localities, under present conditions, can only be conducted at a heavy expense. Besides, these ores, though often rich, are generally among the more complex kinds, requiring peculiar treatment. Practical operations having, however, been mostly attempted by men possessing little or no acquaintance with metallurgy, have generally resulted in failure. Under more skillful management these mines could probably be worked with large and steady profits. The copper ores found in that part of the State bordering on Arizona are usually argentiferous, sometimes very highly so; and from these and other sources, California will ultimately, no doubt, become a large producer of silver. But at present most of the silver actually obtained in this State is derived by separation from the gold, which always contains more or less of it as an alloy—the amount procured from this source not being large. Thus, it will be seen, silver is not a leading, but rather an incidental product of California mining; and the metallurgical treatment of its ores, though of vital importance in the adjoining State of Nevada, is of little practical moment in California.

## GOLD.

Among the mineral products of California, gold is incomparably the most important metal. Rapid and immense as has been the development of this branch of mining in California, it is yet, in view of future results, scarcely more than barely entered upon, the repositories of this form of wealth remaining comparatively intact. Gold, with rare exceptions, is found in the native or metallic state. It is never, however, perfectly pure, being always alloyed with more or less silver, and sometimes also with small quantities of platinum, copper, iron, mercury, palladium, iridium, rhodium, etc. It also occurs in a mineralized condition in connection with other metals combined with tellurium. The minerals, sylvanite and nagyagite, are examples of this mode of occurrence; and other compounds of the same class, whose characteristics are as yet but imperfectly known, have been found at Carson Hill, in Calaveras county, at the Rawhide Ranch Mine in Tuolumne county, and at a few other localities in the State. But these telluric compounds of gold, though rich in this precious metal, are of rare occurrence, and possess no general interest. It has been a matter of doubt with some, whether the gold present in auriferous pyrites, mispickel, etc., existed in the metallic state or mineralized in combination with sulphur. The prevalent opinion among the best chemists being that in these ores the gold is always in the metallic state, though its mechanical subdivision is in this case almost chemically minute—it will here be assumed that such is the fact. The metallurgy of gold is thus entirely confined to the separation or extraction chiefly, though not entirely, by mechanical means, of the native metal from the earthy débris or the rocky gangue, which may accompany or contain it.

In the consideration of native gold, our attention is first drawn to the fact that it occurs extensively in two distinct and well characterized conditions. It is found either in the solid rock, usually in veins, whose gangue is almost universally quartz, accompanied by various metallic oxides and sulphurets ; or else it is found in alluvial deposits, in the form of minute scales, pellets, coarser grains, or larger pieces, always more or less water worn, and mixed with the sand and gravelly débris of all sorts of rocks, whose degradation and comminution have been the slow work of ages preceding the advent of man. To the latter class of deposits the general name of placers has been given, and from these two prominent modes of occurrence have arisen two distinct modes of mining, viz : placer, and quartz, or vein mining.

## PLACER MINING.

The placers themselves may be again subdivided into two prominent classes, the deep and the shallow ; or, speaking generally, the ancient and the modern placers. In California, these deposits, particularly the shallow placers, are also frequently styled "diggings," and these have again been further characterized according to their topographical position, as river, gulch, bar, flat, bench, and hill diggings ; while the deeper placers have been called hydraulic diggings, tunnel diggings, etc., according to their situation, and the means adopted for their exploitation. At first operations were almost entirely confined to the shallow or surface diggings, which owe their origin in great measure to the denudation and degradation, by mountain streams, of the older and deeper detrital formations—enormous quantities of the earthy and lighter materials having been washed away, while the gold has been left in a concentrated form and in positions readily accessible to the miner. Many of these shallow diggings, exceedingly rich when first discovered, having long since become either exhausted or greatly impoverished, are now almost wholly abandoned to the Chinese.

The methods and implements employed in placer mining, and by means of which such immense quantities of the precious metal were once extracted, seem insignificant compared with those now in use. In all placer mining the gold is obtained by washing the auriferous gravel, the sand and earthy matter being carried off by a current of water, while the gold, owing to its vastly greater specific gravity, remains behind, and can then be collected by itself in the metallic state or amalgamated by means of mercury.

## THE SHALLOW PLACERS.

The principal implements employed in shallow placer mining are the pick and shovel, horn spoon, pan, cradle or rocker, long tom, and the sluice. The horn spoon is made by a lateral section cut from the horn of an ox, which, being scraped thin, forms a sort of curved spoon, from one to two inches in depth, two to three inches in breadth, and six to ten inches long. This spoon is used exclusively for "prospecting purposes"—that is, for testing the richness of auriferous gravel or pulverized rock, by washing in it small quantities at a time. In its use some skill is required, especially when, as is often the case, the gold dust is very fine, to save and exhibit as nearly as possible the whole of the precious metal present. This spoon holds at most but two or three pounds of earth, and it might seem that tests so rudely made could be of little value. It is found, however, to answer this purpose better than might be expected ; and it is surprizing how closely an experienced prospector will estimate the probable yield of rock or gravel, after having made a sufficient number of trials with it to enable him to approximate an average of the mass.

The pan in present use is usually stamped from thin sheet iron, possessing the advantages of lightness and strength, while at the same time it is not attacked by the mercury often used. In shape and size, this implement resembles an ordinary circular dairy pan, with a twelve or fourteen inch bottom, the chief difference consisting in its having a more flaring form. In using this pan, it is first filled with the auriferous earth, which is then taken to a stream, puddle, or tub of water near at hand, for washing. Being submerged, if the material be clayey in texture, it is worked over with the hands till it becomes disintegrated, and then the washing commences. One side of the pan being held a little higher than the other, by a peculiar circular motion of the hands a revolving current is produced within it, which carries away the lighter portions over its top, while the heavier matters remain behind. In this way the earthy particles are gradually washed away, the pebbles being removed by the hand, until nothing is left but the gold, either entirely clean, or mixed with a small quantity of heavy sand. The residue thus obtained is either saved until more has been accumulated, and then, if necessary, carefully washed as clean as possible, or it is amalgamated with a little mercury. With the pan, as well as the horn spoon, it requires practice and skill to wash rapidly and well. In the earlier days of mining the operation of washing for gold was mostly performed by the pan. It rapidly gave place, however, to the cradle, the long tom, and the sluice, and is now very rarely used, except for mere prospecting purposes. It is also indispensable in the "cleaning up" of sluices, and also about quartz mills, as a means of washing and saving small portions of amalgam.

The cradle and the long tom, as successors of the pan, were improvements on the latter as means for extracting gold—each in its day being the most efficient implement known for that purpose. Both, however, were superseded by the sluice, and can now be rarely seen, except where used occasionally by the Chinese, for which reason a particular description of them is here omitted.

The sluice, in its various forms, is now the apparatus generally employed for separating the gold from the worthless matters with which it is mixed, in both the deep and the shallow placers. In form and dimensions it varies to suit the work for which it is intended, being in some cases but a few feet long, while in others, especially in hydraulic mining, its length reaches several thousand feet. The sluice is essentially a long, slightly inclined trough, through which a rapid stream of water flows, the bottom being provided with a suitable arrangement for catching and retaining the heavier particles, while the lighter are carried forward and discharged with the water at its lower end. In its ordinary form as applied to shallow placers, it consists of a series of wooden troughs open at the ends, each being from ten to twelve inches deep, from fifteen to twenty inches wide, and twelve feet long. They are constructed of rough pine boards, from an inch to an inch and a half thick, and are made three or four inches narrower at one end, so as to fit into each other, and thus form a continuous sluice of any desired length. By this arrangement they can be rapidly put together, and as readily taken down and removed. The sluice is set to a uniform grade, so that the fall in each twelve feet, or the length of a box, is from ten to eighteen inches, according to the character and quantity of the material to be washed. If the fall in twelve feet be ten inches the sluice is said to have a ten-inch grade. Across the bottom of each box is nailed a number of cleats called riffles, intended to catch and retain the gold and amalgam. As these riffles and the bottom of the sluice itself would soon be worn out if left unprotected, by the stones and gravel passing over them, a set of false riffles, consisting of a frame of slats, is placed longitudinally in each box, presenting the necessary cavities for catching and holding the gold, while its surface is such as to present the least possible resistance to the stones and gravel passing over it.

The most common style of riffle in sluices for shallow placers, is formed of strips of plank two or three inches thick, from three to six inches wide, and about five feet six inches long, being nearly half the length of a single box. These strips are placed on edge, an inch or two apart, side by side, longitudinally along the bottom of the box, being properly wedged to keep them in place. There is thus formed a series of narrow rectangular depressions, having a depth equal to the width of the strips, and which, though quickly filled with sand when the sluicing is commenced, still present a sufficient number of cavities and inequalities to retain the particles of gold, while the pebbles are carried smoothly forward by the current of water. When, however, as often happens, the gravel to be washed contains large quantities of stones, the wear upon the riffles, even with the best arrangement, is severe, necessitating frequent renewal. To meet this emergency, instead of the riffles described, the sluice is paved with blocks of wood cut crosswise the grain, and placed with the fibres in a vertical position on its bottom, narrow spaces being left between the blocks which fill with sand and serve to retain the gold. These block riffles are not only durable, but very efficient in saving the amalgam and gold. If the placer gold dust were always course the riffle would be a complete and all-sufficient means of saving it. But, since this is not the case, the grains being of all sizes, from nuggets several pounds in weight down to an almost impalpable powder, so fine that when dry it will readily float upon the surface of the water; or if suspended in it, be carried along by the gentlest current; the use of mercury in the sluice becomes necessary to arrest and save these minute particles, which even this agent, with its strong affinity for gold, is not always able to accomplish, in as much as many of them, borne along by the water, do not reach the bottom where the mercury lies while traversing the length of the longest sluices.

Frequently, also, a portion of the gold is covered by a thin but closely adherent pellicle of oxide of iron, which prevents it amalgamating readily, although it may come in actual contact with the mercury. Many contrivances have been resorted to, with more or less success, to effect an amalgamation of this "rusty gold," so called, with the quicksilver, of which the "under current sluice," described in connection with hydraulic mining, is, perhaps, the most important. Amalgamated copper plates are also frequently used near the lower end, or "tail" of the sluice. But in spite of all efforts to save it, there is still a heavy loss of the finest gold, a result that can only be wholly prevented by the application of more effective means than any yet developed in practice, or, perhaps, known to science.

When the sluice is finished and the riffles are in place, the work of washing commences. A stream of water, graduated by its capacity and the character of the dirt to be washed, being turned into it, while the auriferous earth is shoveled in, unless where hydraulic pressure is employed. For the ordinary sluice, the quantity of water required varies with the conditions as above stated—from twelve to twenty inches being about the usual amount, which is called a sluice-head.* As soon as the depressions between the riffles have become fairly filled with sand and gravel, a quantity of mercury is sprinkled along the sluice near its head, whence a portion of it gradually finds its way down through the lower boxes, additional quantities being often scattered at intervals along it.

The finer the gold the more mercury is required; the latter, when the dust is coarse, not being introduced at the head of the sluice, but at some distance below, so as to amalgamate only the finer particles of gold. The coarser the gold, the heavier also may be the grade of the sluice and the stronger the current of water employed. But the limits of ten and eighteen inches, already mentioned for the grade, are rarely passed in either direction. While the washing is going on, the sluice needs but little attention, except what is required to prevent it from choking. Where, however, stones of the size of a man's fist, or larger, are numerous, it is customary to throw them out with a fork, after they have rolled far enough to be thoroughly cleansed of any adhering mud which might contain gold, instead of letting them run the whole length of the sluice to no purpose except to wear it out.

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* The miner's "inch of water" is the quantity discharged through a vertical opening of one square inch cross section under a mean pressure, or head, which varies in different parts of the State from five to nine inches. The inch of water is, therefore, somewhat indefinite, fluctuating in volume from 80 to 110 cubic feet per hour, the average value throughout the State not being far from 100 cubic feet per hour.

The washing once begun, is carried on sometimes without interruption day and night, more commonly, however, only during the day, for an indefinite period, which, whether long or short, is called "a run." These runs may consist of a few days only, or may extend over several weeks or even months. The operation of collecting the gold, mercury, and amalgam, which have remained in the bottom of the sluice, is called "cleaning up." When it is decided to clean up, no more dirt is thrown into the sluice. The water, however, is permitted to run until it passes off clear at the lower end, when it is shut off. The riffles commencing at the head of the sluice are then taken up for a distance of thirty or forty feet, when the sandy residue is washed down from this portion, passing through the sluice, while the gold and mercury are caught in front of the first remaining riffle, from which they are carefully removed with a little scoop and placed in a pan. The riffles are then put down again, the miner proceeding through the entire series in the same manner. When all the amalgam is thus collected, it is carefully washed clean in the pan, and then strained through buckskin or canvass, which allows the liquid mercury to pass, while the solid amalgam is retained to be afterwards retorted and melted. The strained and well squeezed amalgam usually yields from thirty-five to forty per cent. of its weight of retorted gold. The retorting consists simply in heating the amalgam to such an extent as to volatilize and expel the mercury and thus separate it from the gold which remains behind. But in order to protect the operator from the poisonous mercurial vapors, as well as to save the mercury and obtain it again in a condition fit for further use, this operation must be conducted in an air-tight vessel provided with a condensing chamber. The apparatus commonly employed for this purpose consists of a cast iron retort, with a cover; first, well luted, and then screwed down to its place and held fast by means of a clamp screw. From the center of the cover rises a small iron pipe, which, bending, passes over to the condenser. The latter generally consists simply of a vessel containing cold water, beneath the surface of which, however, the pipe is not allowed to dip, its end being wrapped with one or two thickness of canvass so as to form a short hose reaching into the water. The reason for this precaution is, that if the temperature of the retort were suffered to fall low enough to produce a condensation of the vapors within, the water would then rise through the pipe, and entering the retort, would there be suddenly converted into steam, rendering a dangerous explosion imminent. In the performance of this process the retort should be heated very gradually, the temperature not being allowed to rise higher than a dark red heat, though this should be maintained long enough to effect a complete removal of the mercury. The gold thus obtained is in a very porous and spongy condition, requiring to be melted and run into bars before it is fit for sale and transportation.

## RIVER MINING.

By this expression is not meant the working of the bars accumulated along the mountain streams in times of freshets, and afterwards laid bare by low stages of water, enabling them to be conveniently worked; for this, though in one sense a branch of river mining, has nevertheless its own appropriate name, such deposits being termed "bar diggings." The term "river mining," in the sense here used, comprises a more extensive class of operations, involving the damming up and the turning into a new channel, often for considerable distances, of the whole volume of the waters of a river, thus laying bare its entire bed for working. Sometimes the new channel is a canal dug in the ground along the sides of the river ; but oftener, especially where this is impracticable, a large and costly flume is constructed for the purpose. These works, as well as all others requiring great outlay, are generally executed by an association of the miners who do the work themselves, and furnish each according to his ability the additional capital required, receiving afterwards a proportionate share of the profits, if such ensue. When the preliminary work has been completed, and the waters are turned into their new channel, the bed of the river is staked out into small and separate claims, which are then worked, each by its owner according to circumstances, with the cradle, the long tom, or the sluice.

The operations of river mining are necessarily such as often involve immense expense, while they are always conducted at a heavy risk ; for, besides the possibilities of a breakage of the dam, and the consequent flooding and destruction of the works, and the certainty that this will occur unless everything is removed from the bed of the stream at the commencement of the rainy season, there are the chances that when the chief expense has been already incurred, and the waters are turned aside, their channel will not be found rich enough in gold to repay the cost involved ; and this is a point which can rarely, if ever, be thoroughly tested until the work of turning the stream has been accomplished. But, though the risks of river mining are always heavy, and the losses often large, the profits are sometimes enormous—cases being frequent where the bed of a river is found sufficiently rich in the precious metal to repay in a short period many times the expense involved in laying it dry and working it.

### THE DEEP PLACERS.

It is not easy to draw any well defined line of demarcation between the deep and shallow placers, though the latter may in a general way be designated as those not so deep as to require in their exploitation the application of means and methods which are peculiar to deep placer mining. The depth thus indicated will vary somewhat with circumstances, but may be assumed in general to be in the neighborhood of twelve or fifteen feet. As already stated, the shallow placers are chiefly the results of the work of modern streams in the degradation and concentration of the deeper detrital formations, though this is not always the case, some of them owing their origin to widely different causes. Many of the rich deposits found on the surface or in the cavities of the limestone, such for example as those once so famous in the vicinity of Columbia and Sonora, Tuolumne county, were certainly not the work of modern streams. On the contrary, they are the partial results of the immense system of denudation so extensive on the western flanks of the Sierra, and which, though it preceded the modern river system, was posterior to the accumulation of the great mass of the deep auriferous gravel deposit. The rich diggings about Columbia were evidently formed by the enormous mass of materials having been swept away, while the bottom alone was left *in situ*, or nearly so, with its golden wealth still further enriched by concentration from the hundreds of feet in depth of auriferous gravel which have disappeared. But while the shallow placers are thus seen to vary more or less in their age and origin, the deeper are exclusively the work of more ancient causes, resulting, as stated in the geological portion of this work, to a great extent, from the action of an older and entirely different river system from that which now exists. They are often hundreds of feet in depth, and are frequently capped with enormous masses of basaltic lava or other volcanic materials which have been distributed over them. In these, as in all other auriferous placers, the gold is generally found to be most concentrated nearest the bottom of the deposit—or, in other words, the gravel is richest nearest the bed rock. The latter, as its name implies, is the foundation, or bed of solid rock, of whatever kind, upon which auriferous placers usually rest, and which, besides this, in the case of the deep placers, has often been the bed of an ancient stream or river. To reach and work the material lying nearest the bed rock, is, therefore, the chief object in all deep placer mining. This is accomplished in different ways, according to the nature of the ground, and the depth and situation of the deposit. Sometimes vertical shafts are sunk through the gravel to the bed rock, and from the bottoms of these, tunnels are driven in various directions, being continued till the pay dirt is reached. These tunnels are supported overhead by timbering, if necessary. The pay dirt thus obtained is hoisted through the shaft to the surface, and then washed in the sluices, or, if it be very rich and water is scarce, with the cradle or pan. This is apt to be an expensive mode of mining, the labor of hoisting the earth through the shaft being considerable, while the pumping, usually required to free the works from water, is even more costly. It is, therefore, never resorted to except in situations which permit of no other means of reaching the bed rock, and where the deposit is known or justly supposed to be rich. Prospecting shafts, however, are often sunk for the purpose of examining the ground, and ascertaining, so far as practicable, its probable richness before more expensive works are entered upon. The two principal methods by which the deep placers are worked, are tunnel and hydraulic mining, both conducted upon an extensive scale.

## TUNNEL MINING.

This style of mining is resorted to where the auriferous gravel is deep, and overlaid by a mass of basaltic rock or volcanic scoria, tufa, and other material, to such a depth as to render it impossible to remove the superincumbent mass, the adjacent valleys being at the same time low enough to permit the bed of the ancient channel to be reached by tunnels driven in from their sides. Tunnels have been extensively employed to reach the deposits under the basaltic Table Mountains of Tuolumne, Sierra, and other counties, which cover the auriferous gravel to the depth of a thousand feet or more. By this system the bed of the ancient river is reached by long tunnels driven from the adjoining valleys through what is termed the rim rock, being that which forms the borders of the ancient channel, and which rises sometimes to the height of one hundred and fifty feet or more above the middle of the channel. The tunnel is intended to strike beneath the ancient river bed, or at least sufficiently low to be upon a level with it, and is driven with just sufficient inclination to drain the works as they proceed. The channel being reached, drifts are run along it, the ground divided up, and the auriferous gravel, commonly termed cement, from its being firmly compacted together, is removed and conveyed in cars to the mouth of the tunnel. Here it is broken up, the disintegration being assisted by jets of water thrown from a hose upon it, after which it is washed in sluices. Extensive timbering is often required to support the roof as the work of excavation proceeds, pillars of pay dirt sometimes being left for this purpose. The thickness of the stratum of pay dirt varies from a few inches to six or seven feet. The length of these tunnels ranges from six hundred to fourteen hundred feet, and instead of being started below the level of the channel, and driven through the bed-rock with such an inclination as to drain the mines, they are sometimes started at the top of the rim rock, or even above it, and driven with a downward inclination into the hill. In such instances the water must be removed by pumping, and the dirt be hoisted or drawn out by machinery—some of these tunnels furnishing sufficient water to wash the gravel taken out. Occasionally the latter is so firmly cemented together as to defy the ordinary means of disintegration and washing in a sluice, in which event it is crushed in a mill and worked like auriferous quartz. But as this proceeding involves the crushing of the pebbles and boulders, generally barren of gold, various contrivances have been employed to disintegrate the cement without involving this result—the most efficient machine yet devised for this purpose being Cox's Cement Mill, which consists of an iron pan six feet in diameter and eighteen inches deep, supplied with four iron rakes or stirrers bolted to arms attached to a vertical central shaft. This shaft, making fifty revolutions in a minute, drives these stirrers with great velocity, separating the cement effectually from the boulders and breaking it up so finely that it passes readily through the longitudinal openings left in the cast iron bottom of the pan. Into the latter a stream of water is kept constantly discharging to aid in softening and washing the cement after it has been brought to the proper consistence for the action of the stirrers. The boulders and larger gravel, after being freed from the cement, are discharged through a trap door in the bottom of the pan—opened and closed by levers. A charge for this pan consists of about one ton of cement, it being able to work thirty-five tons of ordinary material in twelve hours, and forty-five if it is but moderately tenacious or hard. The arrangements for economizing labor are such that one man can attend it—the cost of this washing operation not being over twelve or fifteen cents per ton. With the aid of this pan the earnings of the cement mills using it have been largely increased; and it is believed that large quantities of gravel can now be crushed with profit, that before would not pay for handling.

## HYDRAULIC MINING.

Before proceeding to a description of the practical operations of this mode of mining, it may be well to give some account of the character of the deposits upon which it is applied.*

It is shown by numerous well established facts, that at the close of the geological epoch just prior to the appearance of man upon the globe, the whole of the western slopes of the Sierra Nevada mountains were, below a certain horizon, covered by a vast spread of alluvium, owing its origin to the action of extensive glaciers, which have left the evidence of their former presence everywhere in the higher Sierras. These glaciers furnished the transporting power that brought from above the fragments, which, by long continued action of running water, were worn into the smoothly rounded boulders, gravel and sands forming the gold-bearing alluvia. The melting of the glaciers as their lower skirts reached warmer zones, furnished the water for those ancient rivers, the beds of which are now found far above the level of the present river system, and whose courses are generally crossed by the valleys of our modern streams. This condition of things continued long enough to permit the accumulation of beds of gravel—the gold-bearing alluvium—to a depth and extent without a parallel elsewhere in North America, and as auriferous deposits unequalled elsewhere in the world. Of the thickness of this accumulated matter, there is evidence in numerous places where it has been protected from the action of subsequent denudation by a capping of volcanic material, it reaching here a known thickness of five hundred feet. Usually, however, it has been denuded to one half of this thickness, often more, while in many places it has been completely swept away. Subsequent to the glacial and alluvial epoch to which the gold-bearing gravels are referred, there was a period of intense volcanic activity, the evidence of which is seen most conspicuously in the Table mountains, so called, where the auriferous deposits are covered by cappings of basalt, forming highly characteristic ranges. In other parts of the State, and especially in Nevada and Sierra counties, the volcanic outpourings consisted of ashes and other materials, since consolidated into heavy beds of volcanic mud, mixed with fragments of scoria, tufa, and basalt.

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* In this, as well as in the description of hydraulic mining which follows, the notes of Prof. B. Silliman have been freely used.

Following the outpouring of the volcanic rocks, there was evidently an epoch of very active denudation by running water, which has broken up and removed the volcanic cappings, leaving them only here and there as landmarks showing the ancient levels, and sweeping away, likewise, vast areas of the old alluvium, and redistributing it as secondary or shallow placers at lower levels. This denudation was probably consequent on the sudden disappearance of the system of glaciers, which up to that time crowned the entire range of the Sierras with ice. So complete was the removal of the ancient gravel in some of the southern counties that the gold left behind lay upon the naked rock, covered only by a few inches of vegetable mould.

Before proceeding further it may be expedient to explain certain terms and phrases used in this species of mining, which are not generally understood out of California.

"Blue Gravel" is a term employed by hydraulic miners to distinguish in a general way between the upper and poorer and the lower and richer portions of the auriferous beds of gravel, which latter are usually, though not always, characterized by a peculiarly bluish color. This color is due to the reducing power of organic matter, chiefly vegetable fiber, acting upon the salts of iron present, which, mainly in the form of sulphurets of iron, have become the principal cementing material uniting the gravel and sand into a compact and firm conglomerate, so strong as to require the use of gunpowder to prepare it for washing. When exposed to the influence of air and moisture, this blue color disappears and the mass becomes yellowish and reddish, being often brilliantly colored with various tints of purple and red. It loses at the same time a great part of its firmness and often crumbles to powder, even the pebbles of a certain kind found in it slacking to a sandy consistence. The blue color has no necessary connection with the presence of gold—gravel being thus colored simply because it has been beyond the reach of oxidizing influences.

"The Great Blue Lead" is a term applied to such deposits of cement and gravel as are found to rest in a well defined channel, assumed, not without reason, to have been the bed of an ancient river. That there were many such rivers is clearly proved by what is already known of the topography of this portion of the gold regions. There are obvious reasons why, as a rule, the beds of such streams should be richer than the general surface beyond their banks. These channels when first uncovered are always found well worn by running water, and filled with cavities and "pot holes," where the currents eddied. They vary in width from sixty to four hundred feet, being occasionally much wider, and are sometimes traceable for miles, marking the flow of the ancient river, the course of which is also often indicated by the direction of the deeper grooves, being generally north-northwest and south-southeast.

The term "White Cement" is given by the miners in certain localities to a zone or stratum of whitish color, but of no considerable thickness, which appears to chronicle a pause or interval in the accumulation of the coarser gravel. The gravel above this plane contains less gold than that below, though, owing to its looser texture, it is more rapidly washed away.

With the more or less complete exhaustion of the shallow placers in the ravines and river beds, came the necessity of devising a system by which the deep placers, like these under consideration, could be economically worked. The accomplishment of this object demanded the use of a large amount of capital, to be expended in the construction of canals and aqueducts to convey water from the mountain lakes and streams at a suitable elevation, and in sufficient quantity to command the ground to be worked, as well as for the purpose of opening tunnels and shafts in the bed rock for the discharge of the gravels—operations requiring much labor and skill, and often consuming several years for their accomplishment.

The amount of labor and capital thus demanded called into existence, in various parts of the State, canal and ditch companies, the associates being generally miners, whose limited finances were eked out by borrowing money from bankers at rates of interest varying from three to five per cent. monthly.

Experience has demonstrated that the larger the volume of water employed in the process of hydraulic mining, the greater the efficiency and economy of the operation. The proper application of the powerful mechanical force furnished by large volumes of water under a great pressure, was a problem solved satisfactorily only after many abortive trials and much experience. This problem involves the following conditions :

1st. The whole mass of auriferous gravel must be removed, whatever its depth, quite down to the "bed rock."

2d. This must be accomplished by the action of water alone, human labor being confined to the application of the water and the preliminary preparations it involves, the amount of material to be moved and disposed of in every day of ten hours, being from two thousand to three thousand cubic yards for each first class operation, involving the use of four hundred to six hundred inches of water.

3d. The mechanical disintegration of the compact conglomerate as a part of the uninterrupted operation of the whole system.

4th. The simultaneous saving of gold without interrupting the continued flow of water.

5th. The disposal of the accumulations resulting from the removal of such vast quantities of gravel.

These conditions are in practice met by the following steps: The mining ground being selected, a tunnel is projected from the most convenient ravine, so that starting in the bed-rock, on the face of the ravine, it shall approach the center of the mass to be moved with a grade of from one in twelve to one in thirty-six. The dimensions of these tunnels are usually six to eight feet in width by seven feet in height, the length varying from a few hundred feet to a mile. For driving some of the longer of these works from five to seven years have been required, at a cost of from ten to sixty dollars per lineal foot, varying with the cost of labor and the character of the rock to be excavated. The end of the tunnel is designed to be from fifty to one hundred feet, or perhaps more, beneath the bottom of the gravel, at a point where a shaft or incline is sunk through the gravel and bed-rock to intersect it. It obviously demands careful engineering to carry out works of such magnitude with the accuracy required, and for the want of sufficient care or skill in this particular, years of costly labor and anxious expectation were sometimes spent in the earlier history of these enterprises. The tunnel once constructed becomes not only an avenue for reaching the auriferous deposits, but also a sluice-way, through the whole length of which sluice boxes are laid, both to direct the stream and save the gold. This sluice is two and a half feet wide, with sides high enough to control the stream. The pavement laid down within it is usually composed of blocks of wood cut across the grain six inches in thickness, and extending from side to side. These wooden blocks are frequently made to alternate with sections of cobble stone pavement. In the interstices mercury is distributed, two tons or more of this metal being required to charge a long sluice. Beyond the mouth of the tunnel the sluice boxes are still continued, often for many hundred feet, in a zigzag course, down the sides of the ravine. After leaving the sluice boxes the slum is often run into what are termed long tail sluices, through which it flows, still depositing a little gold for thousands of feet, when it is finally discharged to find its way to the plains below, rendering thick and turbid all the streams into which it flows; these accumulated tailings discoloring even the waters of San Francisco bay. At each change of direction of the zigzag sluice, and sometimes at other points, the "under current sluice" is usually introduced, being constructed and arranged as follows: At the end of the last sluice box above the under current, a grating of iron bars is placed lengthwise in the bottom of the box, through which a portion of the water and finer material falls, upon a series of more gently graded sluices below, from two to five times the width of the main sluice. These sluices are placed at right angles to the other, and are often lined with amalgamated copper plates, and provided with mercurial riffles, which, in connection with the gentler current, materially assist in saving the finer gold. The great body of the gravel with the large boulders meantime go dashing forward, being precipitated in places over falls from twenty to fifty feet in height, thus producing by the crushing and grinding effect a great disintegrating power. From the bottom of this fall the materials are immediately taken up by a series of boxes, and being again joined by the stream from the under current, flow on, the process being repeated, often many times, before the bottom of the ravine is reached.

The water from the canal is brought by side flumes to the head of the mining ground with an elevation of from one to two hundred feet above the bed-rock, whence it is conveyed to the bottom in iron pipes, sometimes sustained by a strong incline of timber. These pipes are of sheet iron of adequate strength, riveted at the joints and measure from twelve to twenty inches in diameter. They communicate at the bottom with a strong prismatic box of cast iron, in the top and sides of which are openings for the adaptation of flexible pipes made of a very strong fabric of canvas, strengthened by cording, and terminating in metallic nozzles of from two and a half to three inches in diameter. From these nozzles the streams are directed against the face of the gravel to be washed, with immense force.

The volume of water employed varies with the work to be done; though frequently four different streams, each conveying a hundred inches or more of water, are brought to bear simultaneously on the face of the same bank. Five hundred miners' inches of water, approximately equal to 53,000 cubic feet per hour, are often discharged against the face of the bank, with the great velocity and pressure due to the head employed.

Under the continuous action of this enormous mechanical force, aided by the softening power of the water, large sections of the gravelly mass are readily broken down and washed away. The débris speedily dissolving and disappearing under the force of the torrent, is hurried forward in the sluices to the mouth of the shaft, down which it is precipitated with the whole volume of water. Boulders weighing hundreds of pounds, accompanied by masses of the harder cement, are carried forward, encountering everywhere on their passage, and especially in the plunge over the fall, the crushing agencies necessary for their disintegration.

The heavier banks, of eighty feet and upwards, are usually worked in two benches; the upper and poorer, being also less firm, is worked away with greater rapidity. The lower section is usually much more compact—the stratum on the bed-rock being strongly cemented by sulphuret of iron and resisting even the full force of the water until it has been loosened by powder. For this purpose a tunnel is driven in on the bed-rock, from forty to seventy feet from the face of the bank, from the inner extremity of which another is extended to some distance on each side and at right angles to the first. In this cross tunnel is placed the charge, consisting of from one hundred to five hundred kegs of powder, fired as a single blast. The effect in shattering and loosening, in all directions, the heavy mass of conglomerate, is tremendous—fitting it for the ready and efficient action of the water.

Sometimes in the softer, upper stratum, a sytem of cross tunnels is extended, as practiced in coal mining, leaving blocks, which are then washed away; after which the whole mass settles and disintegrates easily under the influence of the water. A double set of sluices is usually placed in these long tunnels, in order that one set may be cleaned up while the other is in action.

The process of cleaning up is performed at intervals of from twenty to forty days, according to the size of the works and the richness of the earth. Advantage is taken of this occasion to reverse the position of the blocks and stones when they are worn irregularly, and to substitute new ones for those which are worn out. The action of the washing upon the blocks is rapid and severe, demanding a complete renewal of them once in eight or ten weeks. Some miners prefer a pavement consisting entirely of cobble stones, though most of the sluices are paved with wooden blocks, with or without alternating sections of stones.

Rude as this method of saving the gold by hydraulic washing may appear, experience has shown that more is saved by it than by any other mode yet devised, while its economical advantages are incomparably greater than those of any other. In fact it would be utterly impossible to handle such masses of poor material with profit in any other manner, or by any other agency than that of water.

To show the advantages possessed by this system as compared with those formerly in use, assuming wages to be three dollars per day, the cost of handling a cubic yard of auriferous gravel is approximately as follows: with the pan, $15; with the rocker, $3 75; with the long tom, $1; with the hydraulic process, 15 cts.

By no other means does man more completely change the face of nature than by this process of hydraulic mining. Hills melt away and disappear under its influence, every winter's freshets carrying to lower and yet lower points portions of the detritus, while whole valleys are filled with clean washed boulders of quartz and other rocks. Meanwhile the Sacramento and its branches, as well as the San Joaquin, flow turbid with mud. Bars are formed where none existed before, and the hydrography of the bay of San Francisco is changing under the influence of the same causes. The desolation which remains after the ground, thus washed, is abandoned, is remediless and appalling. The rounded surface of the bed rock, torn with picks and strewn with immense boulders too large to be removed, shows here and there islands of the poorer gravel rising in vertical cliffs with red and blue stains, serving to mark the former levels, and filling the mind with astonishment at the changes, geologic in their nature and extent, which the hand of man has wrought.

## QUARTZ, OR VEIN MINING.

Before proceeding to treat particularly of the means and methods employed in the mining and subsequent treatment of auriferous quartz, something may be said, in a general way, as to the modes of occurrence of gold in the rocks, and of the more prominent features and characteristics of auriferous veins, or "ledges," as they are usually styled by the California miner.

It has been stated in the early part of this chapter, that when gold occurs *in situ* in the rocks, it is usually found in veins of quartz. It has also been stated, in the chapter devoted to geology, that the great gold-bearing region of the State, viz: the western flanks of the Sierra Nevada, is of comparatively recent geological age; that it consists almost entirely of slates, varying largely in lithological character, but having a remarkable uniformity of strike and dip, the former being, with few exceptions, approximately parallel to the central axis of the Sierras, while the latter inclines generally at a high angle to the east, or towards this central axis.

The innumerable veins of quartz with which this region is filled, do not, in general, form a network cutting each other and the strata in various directions, and dipping at all imaginable angles, as is commonly the case in other regions, more particularly in many of the mineral districts of Europe. On the contrary, the veins here lie parallel with the stratification of the slates, being enclosed between the beds, with which they conform both in strike and dip. There are, however, exceptions to this general rule, a vein occasionally cutting the strata with a strike and dip, entirely independent of them—these cases, in some localities, being rather frequent.

The gangue of the auriferous veins is almost always quartz. Near the surface, the associate minerals are chiefly the oxidized ores of iron, copper, lead and zinc; the sulphurets of these metals, at depths beyond the reach of atmospheric influences, being of general occurrence: the latter are sometimes accompanied by arseniurets of iron, etc., and occasionally by rarer combinations, such as the tellurides of Carson Hill and other localities. Sometimes the gold in the veins is distributed with remarkable uniformity throughout the whole mass of the gangue, while in other and more numerous cases the reverse is true. In some instances, portions of the foot-wall prove the richest, while in others, that next the hanging wall is the more highly auriferous.

Often the veins are more or less banded in structure, in which case the gold is apt to lie in streaks parallel with the banding of the quartz. Occasionally it lies mainly in "chimneys," or "chutes," having a pitch in the direction of the strike of the vein; and not infrequently there is the greatest possible irregularity in its distribution, some portions of the vein matter being extremely rich, while others immediately adjacent are almost entirely barren. In some spots the gold is coarse, while in others it is impalpably fine—much of the rock that pays well to work showing no gold whatever to the naked eye. Sometimes the vein-stuff adheres strongly to the walls of the adjoining country rock; so that the former cannot be removed without breaking off much of the latter, while, again, the cleavage or parting between the two is perfect and clean. Frequently the vein and the country rock are separated by a selvage or clay band an inch or two in thickness; a condition that greatly facilitates the removal of the former. Often the walls, as well as the surface of the vein, are marked with parallel striæ, showing the direction of dynamic action, the surface often being not only worn smooth, but even beautifully polished by this movement. The gold occurs distributed more or less throughout not only the hardest and most compact quartz, but also in the more soft and cellular portions thereof, it being also present to a greater or less extent in the various metallic sulphurets scattered through the veins, particularly in iron and arsenical pyrites where the latter occurs, both of these minerals being often extremely rich.

The gold is not, however, entirely confined to the limits of the metalliferous vein; frequently existing as well in adjacent portions of the wall rocks—sometimes to such an extent as to remunerate well the cost of extracting and working it. Cases have occurred, as at Carson Hill, where the soft slates adjoining the veins, for a foot or more in thickness, were found to be immensely rich, equalling in this respect even the richest portions of the quartz itself. But, although the quartz veins are everywhere the chief matrix of gold, they are not its invariable accompaniments. Within the past few years this metal has been found at certain localities in considerable quantity, distributed throughout broad bands or patches of the metamorphic slates, unaccompanied either by quartz in notable quantity, or by any distinct and definite vein formation. In these cases the rocks are shown to have been highly impregnated with metallic sulphurets of various kinds, the most prominent of which, however, was iron pyrites. The slow decomposition and oxidation of these sulphurets, as the result chiefly of atmospheric causes, have in many places entirely changed the chemical character and consistence of the rocks, replacing many of their original constituents by others of a very different kind. By this process, too, the whole mass of rock has sometimes been so softened as to set free the particles of gold once contained in the sulphurets, leaving the rocks often stained with a variety of brilliant colors, due to the metallic oxides and salts resulting from their decomposition.

But this subject of the modes of occurrence of gold *in situ* in the rocks, and other questions connected therewith, although exceedingly interesting, form too broad a field to permit of further consideration here; therefore, we proceed to notice briefly the principal means and methods employed in the mining and subsequent treatment of the ore.

## MINING OPERATIONS.

As the extraction of auriferous quartz does not vary materially from other vein mining as practiced in different parts of the world, it hardly requires a special description in this place. When the vein is so situated that it can be reached, at a considerable depth below its outcrop, by means of a tunnel extending nearly horizontally from the hill-side or from an adjoining valley, such a tunnel or adit is first driven, drifts being afterwards extended from it in each direction along the vein. The auriferous quartz above is then stoped out, and conveyed in cars through the tunnel to its mouth, and thence to the mill.

Where, however, the character of the ground does not admit of this mode of exploitation, or where it becomes desirable to reach deeper levels than can be attained by such a tunnel, shafts are sunk ; either vertically, to intersect the vein at a given depth, or in an inclined direction from the outcrop with the dip of the vein. Drifts or levels are then extended at proper depths in each direction from the shaft, dividing the ground into a series of vertical "lifts" as they are called, the heights of which between the drifts vary from thirty or forty to one hundred feet The ore in each "lift" is then stoped out, and falling into the drift below, is conveyed to the shaft, through which it is hoisted, usually by steam power, to the surface. The machinery and gearing used for hoisting, pumping, and handling the ore and waste rock, are pretty much the same in kind the world over. For raising water, the Cornish pump is, perhaps, more extensively used at present than any other. In some instances a compact, double-acting, steam force-pump is employed instead, and being placed at the bottom of the mine, is fed with steam brought down in a pipe from the boilers above; and which, having done its work, is discharged into an exhaust-pipe, and re-conducted to the surface. The ore is not, as a general thing, subjected to any further breaking than that incidental to its extraction until it reaches the floor of the mill. It usually, however, undergoes a kind of rough sorting, whereby such portions as are known to be worthless are rejected ; and where the veins vary greatly in richness, considerable portions of ore, obviously of a very low grade, are often left standing in the mine. Upon reaching the floor of the mill, the ore is broken to a size suitable for the stamps, either by hand, or, more generally of late, by being passed between the jaws of powerful crushers, moved by steam.

### MILLING MACHINERY AND PROCESSES.

A modern quartz mill for the working of auriferous ores, consists of the stamps, with their necessary accompaniments for crushing and pulverizing the ore, together with the additional arrangements, of whatever kind, below the stamps for catching and saving the gold thus set free from the gangue.

The stamp is a long, vertical iron stem, moving in guides, and furnished at the bottom with a heavy iron head. It is lifted vertically by machinery, and in falling, crushes by its weight and the momentum it acquires, the rock placed in an iron trough beneath.

The California stamp, in its most recent and approved form, consists of four distinct parts, viz : the stem, the head, the shoe, and the tappet. The stem is a smooth wrought-iron cylinder, from two and a half to three inches in diameter, and generally twelve feet long. The ends are turned with a slight conical taper for a few inches, in order that they may easily and strongly wedge themselves into the corresponding socket in the head, either end being fitted to connect with the latter.

The stamp-head is a cylinder of cast iron, usually eight inches in diameter, and from twelve to eighteen inches in length. Each end is supplied with a socket, or hole; the one to receive the stem, and the other and larger, the neck of the shoe. Each end of the stamp-head is strengthened by a thick band of wrought iron, driven on while hot, and shrunk to its place.

The shoe is a shorter cylinder of cast iron, generally of the same diameter as the stamp-head, and from four to six inches thick, being so formed that it can be easily attached to or detached from the latter; its removal being necessary when too much worn for further service.

The stamp is lifted by a cam, usually double armed, though sometimes single, fixed upon a revolving horizontal shaft, and working close by the side of the stem, against the flat under surface of the tappet. It is curved in such a way that the horizontal surface of the bottom of the tappet, at the point of contact between the two, is always tangent to the face of the cam at any instant during the rise of the stamp. The stem is kept in proper position by two guides, six or seven feet apart, the one above the other, between which are the cam, shaft, and the tappets. A result of this form and arrangement of the stamp is, that the cam, in lifting it, also imparts to it a rotary motion, which, continuing while the stamp is falling, increases somewhat by its grinding tendency the crushing effect of the blow. But the great advantage of this rotary motion is, that the constant change of position produces a uniform wear of the shoes and dies, which it would be difficult to secure by any other means.

The weight of the stamp complete varies from five hundred to nine hundred pounds, and the height of fall from eight inches to a foot. The speed at which they are driven is generally about sixty blows each per minute. Each stamp can crush from one to three tons of rock in twenty-four hours, according to the fineness of the crushing and the character of the rock.

The number of stamps in a mill varies of course with the amount of work to be done, ranging all the way from three or four to sixty or more, the average number being about fifteen or twenty. The stamps are arranged in what are called "batteries," each battery consisting of four or five stamps, working together in a separate cast-iron box, or mortar, though two or three batteries are usually driven by the same cam-shaft.

The mortar is a heavy rectangular cast-iron box in which the stamps play and the ore is crushed. Its weight varies according to the number and size of the stamps, four or five stamps of ordinary size requiring one weighing from two thousand to three thousand five hundred pounds. Its interior dimensions, at the bottom, are such as to have but an inch or two of clear space between the stamp-heads and its sides, which are from three to five feet high. There is a longitudinal opening, three or four inches wide, in the back side, protected by a vertical apron, and running the whole length of the mortar, through which the broken ore is fed. In the bottom of the mortar, on the inside, are cast cavities for the reception of the dies upon which the stamps fall. The dies are also of cast iron, one for each stamp. The lower part of the die, which fits into the cavity in the mortar, may be cylindrical or rectangular. The upper portion is cylindrical, projecting from three to five inches above the bottom of the mortar, and has generally the same diameter as the shoe. In the front side of the mortar, with its lower lip at a proper height, from two to four inches above the tops of the dies, is the discharge opening, from a foot to twenty inches in vertical width, and running the whole length of the mortar. The latter rests upon blocks, the best form of which, in ordinary ground, consists of sticks of heavy timber, from ten to fourteen feet in length, and from two feet to thirty inches square, according to the size of the mortar and the weight of the stamps. These blocks are set in couples vertically imbedded in the ground, to a depth of from five to eight feet, two of them being used to support a single mortar. Their tops are brought as nearly to the same level as possible in setting them, and are then planed true and level. And, as it is important that the contact between the mortar and the blocks should be close and uniform, the bottom of the former is also planed true before it leaves the shop. The mortar is then placed upon the blocks and strongly bolted to them. In the discharge opening already noticed, is fitted the screen-frame, a rectangular frame of wood, to which is fastened the screen. The latter consists of a strip of sheet iron, perforated with small holes, through which the discharge from the batteries takes place. Sometimes wire cloth is used for this purpose, but the punched sheet iron screens are generally preferred. The size of the holes varies considerably with the fineness of the crushing required. The punched screen most in use, known as No. 6, has holes about .027 inch in diameter, and presents about 195 holes to the square inch of surface. A constant stream of water is introduced into the battery, which, with the violent agitation produced by the motion of the stamps, carries the pulverized ore through the screens out of the battery as fast as it reaches the requisite fineness. The broken ore is usually fed to the batteries by hand, one man being able to tend or feed three or four batteries. It might prove economical to provide the batteries with a self-feeding arrangement—an improvement rarely attempted yet in California, though practiced in Australia and Europe.

The arrangements for extracting and saving the gold from the crushed ore, though varying largely in their details, have certain features always in common; chief among which is the amalgamation of the gold by means of mercury. The crushed ore and water, or the "pulp," as it is called, is led from the batteries through shallow, descending sluices, passing in its way whatever contrivances may be there adopted for saving the gold, being finally discharged as "tailings" from the lower side of the mill. These sluices are from eight to sixteen inches in width, and two or three inches deep, and have an inclination or grade dependent on the degree of fineness of the crushing, the quantity of pulp they are intended to convey, the means employed for saving the gold, etc. There are in general use two prominent modes of amalgamation—the Grass Valley system, so called from its general use in the mills of Grass Valley, and the system of amalgamation in battery.

## THE GRASS VALLEY SYSTEM OF AMALGAMATION.

By this plan no mercury is placed in the batteries, the only portion of gold caught there being such as is too coarse to pass the holes of the screen. Of this coarse gold there is, however, always a notable proportion in the Grass Valley ores. In the practice of this method the bottoms of the sluices are covered with coarse woolen blankets, woven for the purpose, over which the pulp flows. These blankets are spread smoothly, and made to overlap each other in such a way as to prevent the pulp from getting beneath them. As the latter flows over them, the heavier particles, which always keep nearest the bottom of the shallow stream, are caught in the meshes of the coarse fabric and there retained, while the lighter portions pass on with the current. But, as the nap of the blankets soon become filled with sand, which, if unremoved, would soon impair, and, if long continued, destroy their efficiency, it is necessary to frequently remove and wash them, after which they are replaced. For this reason the sluices leading from the batteries are either made double, or three are used for two batteries, so that the pulp from either may be turned into the middle sluice, while the blankets of its own sluice are being washed—an operation that requires to be performed about once every fifteen or twenty minutes. For the purpose of washing, the blankets are placed in a large tub or vat filled with water, where they are thoroughly rinsed, the auriferous sand falling to the bottom. When the blankets have been washed and replaced, the pulp is again turned on, and those of another sluice are subjected to the same operation. The sluices below the blankets are frequently lined with amalgamated copper plates, or provided with mercurial riffles, having also in some cases the pulp conveyed over shaking tables, or subjected to other mechanical treatment, for saving the finer gold before it is finally discharged. All of these contrivances catch some gold, though most of the latter saved below the batteries is caught upon the blankets. The blanket washings are generally rich in gold, and also in metallic sulphurets, when the latter are present in the ore. They are next subjected to amalgamation in order to extract the free gold which they contain, and the sulphurets are afterwards either suffered to escape with the tailings, or are saved and ground with mercury in iron pans, or treated by Plattner's chlorination process. The amalgamation of the blanket washings is sometimes effected by grinding the whole at once in pans with mercury, but more frequently by passing them through Attwood's amalgamator. This machine is used in connection with a short sluice lined with amalgamated copper plates, arranged so as to form a series of little troughs or riffles containing mercury. At the head of this sluice are two or three horizontal semi-cylindrical troughs, of six or eight inches radius, placed parallel to each other transversely across the bottom of the sluice, and partly filled with mercury. The blanket washings are placed in a box or hopper above, and being slowly washed down, are carried over these troughs and the copper plates and riffles below, by a small stream of warm water, a moderate increase of temperature being found to favor the amalgamation. The mercury in these troughs, together with the sand as it passes over them, is kept in a state of constant and brisk agitation by a wooden cylinder revolving in a direction opposite to that of the current, and thickly set with thin blades of iron which dip into the mercury and nearly reach the bottom of the trough.

## AMALGAMATION IN BATTERY.

Frequently, when the gold in the ore is fine, and sometimes also when it is coarse, the plan of battery amalgamation is preferred. By this mode mercury is introduced into the battery, a small quantity being sprinkled in upon the feed side at intervals of from half an hour to two hours, as may be needed—the quantity of mercury required in the battery varying with the richness of the ore and the fineness of the gold ; the average amount being about an ounce of mercury for every ounce of gold obtainable from the ore. If the gold be very fine, more is needed—in practice, the quantity being judged of by the appearance and consistence of the amalgam formed. The amalgam in the battery should be too hard to be readily impressible with the finger, and yet not so dry as to become brittle, which might cause it to break up and be thrown out in little pellets through the screen. A small portion of the mercury is thrown out, which, with the gold it catches on its way, forms a little ridge of amalgam on the copper plate, generally placed under the lip of the mortar outside the battery. This amalgam should be of such a consistence that an impression can be made upon it with the finger, and yet not too easily. If the amalgam becomes too soft, no more mercury is added till it regains its normal condition ; and, on the other hand, if it becomes too dry and hard, the supply is increased until it is brought to the proper consistence.

For the purpose of collecting the amalgam formed in the batteries, the latter are usually partly lined with plates of sheet copper. Upon the surface of these plates the amalgam collects, not in a layer of uniform thickness, but in irregular bunches and little ridges, the position and thickness of which are mainly dependent upon the "swash" produced in the battery by the order in which the stamps fall. The curious effects of this "swash," in determining the distribution of the amalgam upon these plates, is a point worthy of more attention, perhaps, than it has yet received.

Below the batteries come the sluices, with their copper plates, riffles, etc., for saving the gold escaping from the former ; these arrangements, differing generally but little from such as are used in the Grass Valley system ; the blankets and their accompaniments, however, being but rarely used where amalgamation in battery is practiced.

Various opinions are entertained by metallurgists and millmen as to the efficiency and economy of battery amalgamation; some, who have practiced it for years still adhering to it, satisfied with their experience, and, while it is no doubt open to certain objections, it is preferable to all others. Quartz mills usually run steadily both day and night; where, however, battery amalgamation is practiced it becomes necessary now and then to stop the mill for a "clean up"—that is, to collect the amalgam, which has accumulated in the batteries and on the copper plates. Sometimes the whole mill is stopped for this purpose, while at others, in order to save time, a single battery only is stopped and cleaned up, and then another, and so on, till the whole are thus gone through with. A "run" in a quartz mill varies, according to circumstances, from twenty to sixty days. The amalgam obtained is strained and retorted in the manner already described.

For the purpose of extracting free gold from quartz, the ore is rarely reduced to any finer state of pulverization than is attained by crushing under the stamps with the screens already described. But when auriferous sulphurets are present, sufficiently rich in gold to make its extraction an object, they are frequently subjected to a further process of pulverization and amalgamation. This is effected by grinding them in a flow of water and mercury in an arrastra, Chili mill, or in some of the many patent cast iron pans or grinding mills of recent invention. These pans having first been introduced as a substitute for the German barrel in working the silver ores of Nevada, where they still continue in use, were afterwards employed also for working the gold ores of this State; and, although they may in certain cases be used here to advantage, especially in treating such mercurial residues as may be collected from the various parts of a quartz mill, they are nevertheless gradually going out of use, many millmen having discarded them altogether. For a description of these pans, and further information touching the extraction of gold from the sulphureted ores, Küstel's recently published work on Concentration and Chlorination may be consulted to advantage.

## THE MARIPOSA PROCESS.

This process, so called from its having been first introduced at the Benton mill, on the Mariposa estate, consists in reducing the ore to an impalpable powder, by placing it, previously crushed to a coarse sand, together with a quantity of chilled, half-inch cast iron bullets, in a large horizontal revolving cylinder, or cask of wrought iron, thorough pulverization being effected by the friction of the rolling balls. From this "ball grinder," as it is called, the ore is conveyed to a strong airtight iron chamber, where it is subjected to the action of the vapor of mercury, volatilized by means of superheated steam. When the amalgamation of the gold is supposed to be complete, the apparatus is suffered to cool down, and the pulp having been discharged into a receiver beneath, is then washed upon a long copper shaking table, to collect the amalgam formed. This process, so far as tried, has worked remarkably well, though the question of its general economy can hardly be considered settled.

## CONCENTRATION.

The concentration of ores is a subject of importance in California, chiefly in so far as it relates to the separation or extraction of auriferous sulphurets from the mass of ore, of which they usually constitute not more than one or two per cent., the proportion sometimes being much larger. Notwithstanding its great practical importance, the concentration of sulphurets has hitherto received but comparatively little attention in California. At Grass Valley, and in some other localities, they are saved, to a certain extent, to be subsequently worked by the chlorination, or some other process. For this purpose settling boxes are usually employed, to catch the heavier sand, which is afterwards worked over in a sluice, the cradle or rocker being sometimes used to finish up the work. At Grass Valley, recourse has in a few cases been had to a Cornish round buddle, while a variety of patent concentrators have, to some extent, come into use in different parts of the State.

Of the latter, Hendy's concentrator, in its improved form, is believed to be one of the best. This valuable machine, which is designed for separating the finely comminuted quicksilver, amalgam and gold from the refuse matter and collecting the same, as well as for concentrating and saving the sulphurets, operates through a combination of centrifugal force and gravitation—the only principles, as experience has shown, capable of effectually accomplishing this object. Of late this concentrator has been coming into very general use, it having been introduced into many of the leading mills of Grass Valley, at Virginia City, and elsewhere in the State of Nevada; in Arizona, Mexico, Australia, and most other prominent gold and silver producing countries, giving the most unqualified satisfaction wherever tested. But few of these machines, however, are yet based upon a thorough comprehension of the whole subject, inasmuch as they are incapable of yielding under varying circumstances the best attainable results—this question of the concentration of ores being one beset with many inherent difficulties. The problem to be solved can, indeed, be easily stated, since the object to be obtained consists simply in effecting as complete a separation as possible of the particles of ore, according to their different specific gravities. But this, where a large mass of material, consisting of irregular particles of all shapes and sizes, from the coarsest sand to the most impalpable slimes, cannot well be accomplished in a single operation.

While much that is useful may be learned from what has been achieved in continental Europe, it is not to be supposed that everything found to answer well there can be adopted without modification here with equal chances of success, inasmuch as the circumstances are widely and often vitally different; still, many valuable hints, together with much that is capable of direct and advantageous application, have been derived by our metallurgists from the greater scientific knowledge and experience of the Old World.

## PLATTNER'S CHLORINATION PROCESS.

This process, which has been in use at Grass Valley, Nevada county, for several years past, is the only method yet known by which the auriferous sulphurets of California can be cheaply and economically worked upon a large scale; more than ninety per cent. of the gold they contain being obtained by this method. It is now ten years since the chlorination of auriferous sulphurets was first successfully introduced at Grass Valley, and yet there are scarcely more than half a dozen of these establishments in the State outside the limits of that place and the adjacent town of Nevada, so frequently are processes of real merit overlooked and neglected, while those of doubtful utility are liberally patronized.

It is now, however, becoming generally known, that auriferous sulphurets, containing but little silver, can be readily worked to within less than ten per cent. of the fire assay, at an expense of considerably less than twenty dollars per ton. The outlines of the method by which this result is effected being briefly as follows: the concentrated sulphurets are first subjected to a complete and thorough oxidizing roasting, with constant stirring, upon the hearth of a reverberatory furnace, for a length of time varying from twenty to twenty-four hours, according to the condition and character of the ore. In this roasting there are two distinct periods, viz: the first, or oxidizing, and the second, or final period, in which the various metallic salts formed during the first are again decomposed. During the first period the temperature employed is moderate, the ore being kept at a dark red heat only. After the requisite temperature is once reached, comparatively little fuel is required, since the ore itself soon begins to glow, and from this time on, the burning sulphur contributes largely towards maintaining the heat of the furnace.

The most important chemical changes occurring at this stage are the following : the sulphurets are gradually decomposed by the oxygen in the heated stream of atmospheric air constantly passing over them ; the sulphur is oxidized, the greater portion of it burning only to sulphurous acid, which passes off in the gaseous form ; and the metals, originally combined with the sulphur, are also oxidized, a portion to the state of protoxides only, while a portion passes to the state of sesquioxides. The sulphur, however, does not all pass off as sulphurous acid, a considerable portion of it being still further oxidized to sulphuric acid, which combines with a portion of the metallic protoxides. During this period the ore, as it is stirred, constantly exhibits the blue flame peculiar to burning sulphur, throwing out brilliant sparks, produced by the rapid burning, in the heated air, of minute particles of undecomposed pyrites.

When the series of changes above indicated are nearly complete, the evolution of sulphurous acid greatly diminishes, the blue flame and the sparks disappear, and the furnace exhibits a strong tendency to cool down, calling for an increase of fuel, which, being added, the second or final period begins with the resulting increase of heat. The temperature being now raised to a bright red heat, the metallic sulphates formed during the first period are mostly decomposed, the sulphuric acid yielding a portion of its oxygen to the protoxides which pass to the state of proxides, while the sulphurous acid produced is driven off. Thus, at the end of the roasting, if it be properly conducted, and only sulphurets are present in the ore, there remain the oxides of the metals alone with a certain quantity of sulphate of lead, (which is not decomposable by heat alone,) in case that metal is present. Arsenic and antimony, if present, behave very much like sulphur, except that they have a stronger tendency to form arseniates and antimonates, and that the salts so formed are much more difficultly decomposed by heat than is the case with the sulphates, so that a portion of them is always found in the residue, while the quartz remains unchanged. The alkaline earths, if present, are chiefly converted into sulphates, which are undecomposable by heat. But as some of them, especially lime and magnesia, have a tendency in the subsequent operation to absorb chlorine uselessly, and to produce some other undesirable effects, the theory of which has not yet been very well investigated, the roasting is sometimes, during the latter period, in case these earths are present, converted into a chloridizing roasting by the introduction of a certain quantity of common salt into the furnace, which is found to obviate the difficulty. When the roasting is complete the ore is discharged from the furnace and allowed to cool. It is then damped with water to the proper degree (it should be only damped, not wet) and sifted into a large tub or vat—the chloridizing vat,—provided with a false bottom, on which rests a filter composed of broken quartz and sand. The inside of this vat is covered with a coating of bitumen, or other impervious material not attacked by chlorine, in order to protect the wood. The vat is provided with a close fitting cover, which can be luted on and made air-tight. The ore being placed in the vat, chlorine gas is now generated in a leaden vessel by means of sulphuric acid, common salt and binoxide of manganese, and after being conducted through a vessel of water, in order to free it from chlorohydric acid, which, if allowed to pass into the ore, would produce a series of undesirable effects, is conveyed by a leaden pipe to the bottom of the vat. Here it gradually accumulates and rises through the ore. But as it is some time in reaching the top of the vat, the chlorine is generally admitted at the bottom, in order to save time, before all the ore is introduced, and the latter is then gradually sifted in as the chlorine rises.

When the vat is filled and the gas makes its appearance at the top of the ore, which may be known by its greenish-yellow color, as well as by its suffocating odor, the cover is placed over the vat and luted tight. The chlorine is still allowed to enter the vat until it begins to escape through a small hole in the cover, left open for the purpose. The supply of gas is then shut off, the hole in the cover stopped and luted, and the whole allowed to stand for twelve or eighteen hours, to complete the chlorodizing of the gold. Water is then introduced, which absorbs the chlorine and dissolves the chloride of gold formed. The solution is drawn off from the bottom of the vat, a small stream being permitted to run in constantly at the top till the lixiviation is complete. The residue in the chloridizing vat is then thrown away, while the solution obtained, which is precious, as it contains all the gold, is conducted to the precipitating vat or vats.

The chlorine gas employed in this operation is suffocating and poisonous if inhaled, and great care should be taken not to permit it to escape within the building. But there is little danger of sudden death from inhaling chlorine, since a few whiffs of this gas will serve as a sufficient admonition to greater caution.

To the solution of chloride of gold in the precipitating vats is now added a solution of protosulphate of iron, which precipitates the gold in the form of impalpably fine metallic powder. The solution is permitted to stand for some time, usually over night, in order to afford time for the precipitated gold to settle completely. The water is then carefully drawn off, the precipitated gold collected upon a large paper filter, carefully dried, and then melted and run into bars. The gold bars thus obtained, when the work is properly conducted, are .999 fine.

In practice, this process requires careful attention in all its various details, both in the roasting and in the subsequent chloridizing and precipitation of the gold. The presence of silver in any considerable proportion requires, moreover, important modifications of the process. But where only gold is present in the sulphurets, there is little difficulty —none but what can be readily managed by any one who has a fair comprehension of the general principles of the chemistry involved.

As stated, almost the only means yet adopted in California for pulverizing auriferous quartz, is the stamp, employed in the manner already described. Various other modes of crushing have been devised, but none of them have ever been extensively adopted, and it is difficult to foresee by what implement or mode the stamp is to be hereafter superseded, if any. In this connection it may be observed that the style of the California stamp and battery arrangement is in advance of that of any other country; while the means here employed in the best mills, to extract and save the gold, compares favorably with those anywhere in use. But many of the mills in California are still very imperfect in their gold saving appliances, the loss of the finer portions of the metal in the tailings being large.

In the treatment of sulphurets the same is true, though perhaps in a less marked degree; and it may be anticipated that the chlorination process, as it comes to be more widely known and better appreciated, will contribute largely to induce the employment of better and more systematic methods of concentration, the whole securing such economy in saving the precious metal, that a much lower grade of ore will soon be profitably worked than is practicable at present.

In view of the many novel experiments being made, and the new inventions seeking recognition by the mining public, it may be said that the employment of new modes and machinery promises, perhaps, less certain success than an adherence to the old, if only it be used with the requisite degree of intelligence and care.

# CHAPTER X.

## MINES AND MINING.

Rapid Exploration of the Placers—Overestimate of Earnings—Chances Still Good—Improved Conditions—Northwestern Counties—Character of Mines—Gold Beaches, etc.—The Central Districts—Various Branches of Placer Mining—Quartz Mining—Number of Locations—Early Efforts—Present Results—Mining at Grass Valley—A Representative Mine—Butte, Sierra, and Plumas Counties—Gold Bearing Slates and Gossans—Auriferous Cement and Gravel Beds—Openings for Enterprise, Labor, and Capital—Silver—Iron—Quicksilver—The New Almaden Mine—Mineralogy of the Pacific Coast.

As the discovery of gold was the cause that led to the rapid populating and permanent settlement of California, so has the business of mining for that metal since formed the leading pursuit of its inhabitants. For six or eight years after that event, this occupation, in which more than three fourths of the adult population of the State were engaged, was prosecuted almost solely on the bars and along the banks, or in the beds of the rivers and gulches, and upon the alluvial flats that constituted the more superficial placers. During that period this branch of mining advanced from a very crude and imperfect, to the highly efficient and somewhat complicated system now in vogue ; and which, in most localities, renders the exercise of some little skill, and the employment of at least a small amount of capital, essential to success.

Of the various improvements thus from time to time introduced, it may be observed, that they were less the result of a provident foresight than of a steadily increasing necessity growing out of the gradual impoverishment of the richer and more accessible placers, whereby the employment by the miner of labor-saving machinery and processes became imperative, if he intended to maintain anything like his former rate of earnings. These new modes and devices, thus necessitated, multiplied in the ratio that the more superficial diggings became exhausted, compelling the washing of larger quantities of auriferous earth, or the reaching of the more deeply seated deposits with the smallest possible expenditure of time and money.

The various gold washing implements and methods now in use do not by any means embrace all the styles and contrivances that have at different times marked the history of mining invention in California. The present perfection, as exhibited in these appliances and machines, was not reached, as some may suppose, by regular and direct advances from the use of the pan and batea to that of the cradle, tom, and sluice, culminating in the employment of the hydraulic apparatus and the cement mill, without any other modes having been meantime devised and tested. Many different plans were essayed, and scores of machines were invented and tried, to result almost wholly in failure and rejection ; the period most prolific in these experiments being that which marked the transition from the use of the pan to the introduction of the hydraulic mode of washing. During its continuance a multitude of gold saving machines were invented and proved ; some of them being costly, ingenious, and more or less serviceable, while a much larger proportion were not only useless, but absurdly defective, many wholly failing to separate the precious metal from the gravel and sand, while a few possessed the still less desirable property of saving the refuse and rejecting the gold.

For several years after the discovery of gold, the banks of the rivers, and even the roads leading to the mines, were lined with the remains of these crude and worthless machines ; while in San Francisco the warehouses and wharves, and often even the vacant lots, were encumbered with them to a vexatious extent ; their more speedy disappearance from these localities being due to the fact that the erection of forges and foundries created there an earlier demand for old iron.

To even enumerate, much less describe all these inventions, would now be impossible, there being scarcely a model of any of them left, while but few persons remain who could at this distant day accurately describe them in all their details. It may be said of them, however, in a general way, that they consisted of washers of almost every conceivable size, shape and material, involving in their workings every known principle of mechanics, and every movement recognised by dynamical science. Some were propelled by hand, and others by steam or water power. One variety employed riffles, and another sieves or screens as separators. Some were simple, and others complex; some large and ponderous, while others were reduced to the smallest compass, being easily portable in the hand. The effective principle in one kind consisted of a vibratory; in another of a centrifugal, or vertical action. In one case it was proposed to dredge the bottoms of the rivers with a series of endless buckets revolving on a cylinder, while again attempts were made to explore the deep still holes with sub-marine armor. Ingenious, eccentric and diversified, however, as were these contrivances, the fact that none of them ever attained to more than a temporary popularity—a few being too manifestly absurd to secure even a trial, sufficiently attests their general inutility.

The sums of money spent upon these vagaries, during the earlier days of placer mining, amounted to millions of dollars, or their equivalent in time, a great deal of which was wasted in fruitless endeavors to render these new methods and machines available. And yet it cannot, perhaps, be said that this money was all foolishly spent, or this time vainly wasted. Aided by the lights of present experience, it is easy to detect the practical errors then committed, and to point out the fallacious theories entertained ; but it should be remembered that little was known at that day in regard to the origin of placer gold, the agencies by which its deposits were formed, or even the places where it was most likely to make lodgment; while the business of seeking after and gathering it was wholly new to our people, very few of whom had ever seen even the simplest gold washing implement, or knew anything about the manner of using them.

All these were problems to be solved and things to be learned; and to the extent of that, these efforts were undertaken in the furtherance of these objects; they were entirely legitimate and even commendable. Many of these theories were, no doubt, chimerical enough, and the most of these inventions abundantly absurd: still, as all this could only be verified by actual examination and trial, these endeavors, however abortive, fairly challenge not only respect, but sympathy and approval. Though so generally disastrous to those undertaking them, and of little value in their immediate results, they undoubtedly formed a necessary part of that extended system of experiments from which the present highly effective means and modes of operating have been eliminated.

These disappointments and losses, though numerous and severe, were but the sacrifices usually exacted of every great industry at the outset—the crucial trials that many important interests in California, including those of quartz mining, manufacturing, and even farming, have been forced to go through; but which, like the pursuit we are considering, having survived these early trials, are now established on a permanent and prosperous basis.

## RAPID EXPLORATION OF THE PLACERS—OVER-ESTIMATE OF THE EARNINGS.

The exploration of the placer mines, which, during the year of their discovery had been extended to all the more central portions of the great metalliferous range, was pushed so vigorously on the arrival of the heavy immigration in 1849–50, that by the end of the latter year nearly every auriferous gulch and stream of importance in the State, except a few in its more northerly parts, had been discovered and partially worked. The adventurous miner, during this short interval, had, despite the want of trails, the hostility of Indians, and the many difficulties to be encountered, pushed up all the principal rivers and their branches; and there, constructing his rude camp, had worked over in a superficial and hasty manner, the bars of the streams and the beds of the gulches; some of their number taking out large, and a few, immense quantities of gold dust in a very short time. Still, the success of these pioneers was very unequal. If the miner happened to strike a rich deposit, he made large wages—sometimes, quite a fortune, in the course of a few weeks or months at the furthest. Failing in this, it was often as much as the most industrious and frugal could do to earn a livelihood, owing to the enormous cost of subsistence.

Still, these will ever be looked back to as the halcyon days of placer mining, during the earlier portion of which the traditionary ounce, being about a fair average of the miner's daily earnings, continued to be the standard of a day's wages. The current rate of wages was not, to be sure, the exact measure of what could be earned in the diggings, inasmuch as the self-employed miners were, as a class, more robust and energetic than those who hired out their labor; yet they indicate with sufficient accuracy the average earnings of the miner at different periods, showing their rapid decline at first and more gradual depreciation thereafter until they finally reached present rates. From twenty dollars per day in '48, and sixteen in '49, daily wages had fallen to eight dollars two years thereafter, and to less than four dollars by the end of 1858, since which time they have undergone a further decline of about thirty per cent.

From the above it will be seen that the average reward of the miner was comparatively moderate, even while the placers were virgin and uncrowded; it being doubtful if their individual earnings ranged at any time above twenty or twenty-five dollars per day at the utmost. As usually happens, however, in every pursuit where a few meet with marked success, these exceptional cases, often exaggerated far beyond reality, were blazoned through the press and widely published by the busy tongue of rumor, whereby they attained to an immense notoriety; while the hundredfold more numerous examples of failure, being wholly overlooked, often sedulously concealed, were rarely heard of; or, if made known, were disregarded, as being prompted by sinister motives, or were derided as the apologetic devices of the idle and irresolute. And thus it has happened, that a very erroneous impression as to the general productiveness of the California placers at the outset, having, through these means first obtained, is still widely prevalent; many, ignorant of the real facts, deploring their ill luck in not having been among the first to arrive in the mines.

### CHANCES STILL GOOD—IMPROVED CONDITIONS.

If, however, we compare the past with the present, and carefully canvass the advantages and disadvantages incident to both, it will be found that the chances for success do not preponderate so greatly in favor of the former as this class of persons are apt to suppose. In the first place, the cost of living, as above stated, was then enormous; the price of every article, whether of luxury or necessity, being out of all proportion to those now prevailing. Owing to a lack of wholesome food, medical attendance, comfortable dwellings, and other causes incident to the times, the miner was exposed to a variety of diseases—such as scurvy, chronic diarrhœa, rheumatism, etc.—none of which are now prevalent, some of them being almost wholly unknown. Formerly much time was lost to this class in consequence of sickness—deaths, also, being proportionately more numerous than at present. Then, also, the lives of citizens were exposed to constant danger from acts of violence, the whole country being filled with vicious and reckless men, against whose attacks none were secure in either their persons or property. The most audacious murders were perpetrated daily, and often with impunity; while thefts, robberies and similar outrages were things of too frequent occurrence to elicit attention, unless the public, in an ebullition of passion, seizing the culprits, inflicted upon them summary punishment. Then, too, the prospector in pushing out into new regions, had to encounter numerous hardships and dangers arising from the want of roads and trails, from scanty fare, exposure to Indian attacks, and many other evils, from which the explorer is at this day happily exempt.

Much time was also uselessly wasted in searching after gold in localities where with present experience none would think of looking for it; while, as we have seen, a great deal of both time and money was spent in vain endeavors to wash the auriferous earth by means and methods wholly impracticable. With incredible toil the early miner pushed his researches high up into the Sierra, far beyond what is now known to be the furthest limit of the gold-bearing belt, seeking after the illusory sources whence had issued the deposits strewn along the rivers below. Long and wearisome journeys were made away into the depths of the gloomy wilderness over the crests of the snowy mountains, and sometimes out on the hot and arid deserts beyond, in search of mythical mountains composed mainly of the precious metals, or lakes, along the shores of which the sands glittered with virgin gold.

Taught by the mistakes of his predecessors, the modern prospector, avoiding these errors, is enabled to insure for his expenditure of labor and means, if not always more remunerative, at least more certain returns; while, as regards comfort and health, the mining community of California enjoy these blessings in as full measure as almost any other, whether we seek for them in this country or elsewhere.

It cannot, indeed, be said that the opportunities for making "big strikes," as they are termed, or even large wages, are as good now in the placers of this State as they were at first. This is especially true in the case of the man of small means, more particularly if he propose to spend but a short time, as, for example, a year or two only, in the country. But where the new-comer is content to remain a series of years, if necessary, and, proceeding to purchase or otherwise procure an interest in a productive claim, labors diligently, observing sobriety and economy, the chances for his amassing a moderate fortune, in the course of a few years, are fully as good now as ever before. To persons animated with these purposes, the placers of California are scarcely less inviting now than they were fifteen or twenty years ago; while, it may safely be affirmed, that to this class they offer inducements unequalled by any other country or field of labor in the world. Whoever can feel that, in the present altered conditions, he is amply compensated for the somewhat diminished chances for the speedy accumulation of riches, and the excitements incident to an early sojourn in California, may repair to this country with the full assurance that things, considered as a whole, have scarcely changed for the worse; there being still vast tracts of almost virgin mines, in certain parts of the State, open to occupation, while in the earlier settled and more populous mineral districts it is still an easy matter for good workers, or men with small means, to acquire ownership of valuable claims either by location or purchase.

## NORTHWESTERN COUNTIES—CHARACTER OF THE MINES—GOLD BEACHES.

For such miners as are fitted to endure the hardships of a rough and laborious life, the northwestern portion of the State, comprising the counties of Shasta, Trinity, Siskiyou, Klamath and Del Norte, presents a favorable opening. But there are obstacles in the way of emigration to this region; since, besides being far distant from the great centers of population and difficult of access, it is exceedingly rugged; almost the entire surface of the country being covered with broken hills and lofty chains of mountains, separated by deep and precipitous cañons. The climate is rigorous, the winter rains being long continued and heavy in the valleys, and the snow lying to a great depth for several months on the mountains. Until within the past few years.many parts of it were infested by hostile Indians, whose depredations and attacks operated to prevent its settlement and retard the development of the mines. These savages having, however, been subdued, some tribes being exterminated and others gathered upon reservations, no further trouble need be apprehended on their account.

The facilities for reaching this section have also been somewhat improved of late, in the construction of additional wagon roads leading into it from the head of Sacramento Valley, and by the establishment of more regular steamship communication between San Francisco and points along the northern coast, whereby one of the most serious objections to emigration thither has been partially removed; and, it seems probable, in view of the growing importance of this region, that these facilities will hereafter be still further extended, there being a prospect even that they will culminate in the construction of a railroad extending from the bay of San Francisco northward into Humboldt, and ultimately into Klamath and Del Norte counties—such an enterprise having recently been projected, with flattering prospects of being pushed to an early completion.

This northern country is exceedingly well timbered and watered, conditions highly essential in placer mining. There are here also many small valleys well fitted for agricultural purposes, while fruits of all kinds, grow with luxuriance, and the abundance of the native grasses, renders this a very tolerable grazing district. The weather, though stormy in the winter, is not extremely cold except on the mountains, the snow rarely ever falling to any great depth in the valleys, while at all other seasons of the year the climate is genial and exceedingly healthful.

But it is in its mineral resources that this region commends itself to our special attention, the inducements it holds forth being equally strong to the laboring miner, the mill-man and the capitalist. There is here a vast area of auriferous ground, which, with proper management, could easily be made to pay fair wages; even the localities most extensively worked, not generally being so much depleted as to prevent the new comer securing remunerative claims. Much of the country has not yet been thoroughly prospected, leaving a chance for further discoveries—operations having heretofore been chiefly confined to the larger rivers and their principal branches. And even along some of these, it is now believed very extensive and valuable deposits of gold exist, parties lately prospecting certain bars on the Lower Klamath having obtained such results as warrant the conclusion that important diggings will yet be developed at these localities.

It has also been demonstrated by numerous working tests that this section abounds with quartz veins of great richness, the average yield obtained by very imperfect milling processes frequently surpassing that of the most productive mines at Grass Valley. These lodes can, as a general thing, be easily procured, very many of them being in fact still open to location. With the abundance of fine timber growing everywhere throughout the mines, and the ample supply of water, it is obvious that the work of reduction, with machinery once on the ground, could be performed very cheaply.

Klamath and Del Norte counties also contain the most prolific of the several gold beaches, elsewhere in this volume fully described, and which are constantly growing in importance and value. In the vicinity of these deposits others further inland have lately been found, being the remains of ancient sea beaches, formed at a time when the ocean stood at a higher level, or the land was less elevated than at present. Some of these buried beaches are covered only by a few feet of black sand and vegetable mold, and are otherwise favorably situated for cheap and extended working; and it is now the opinion of competent judges, who have carefully examined them, that they will soon become the theatres of profitable mining.

Before dismissing the subject of these northern counties, it may be stated, that beds of auriferous cement and gravel have been found at various points within their limits, being, as is supposed, identical in character and mode of formation with the deep-lying strata of Nevada, Butte, and Sierra counties. Should such prove to be the fact, they will, without doubt, be found extensive, opening a wide and lucrative field for mining enterprise.

Possessing so many natural advantages, and containing as yet but a sparse population, whereby new-comers can take up mining grounds for themselves, and thus become their own employers, this region would seem to present as many inducements to the newly arrived miner, or others of that class who may be desirous of changing their location, as any other in the State.

## THE MORE CENTRAL DISTRICTS—VARIOUS BRANCHES OF PLACER MINING.

To such as prefer pursuing their vocation in the older and more populous districts, there are the several departments of mining comprising the surface placers, the deep-lying cement and gravel beds, and the vein or quartz working branches of the business to choose from, each offering advantages according to the means, experience, and purposes of the party proposing to engage in it. Concerning all these, so much has been said in various parts of this work, more especially with reference to their modes of occurrence and the implements and processes employed for carrying them on, that the remarks in this chapter will be confined chiefly to considerations connected with mining as a profitable field for labor and investment.

And here it may be proper to observe, that by the term *mining*, is meant the business of prospecting for, purchasing, exploring, and practically working the auriferous deposits of this State, of whatever kind, with a view to the profits that may be made to accrue from this pursuit, followed as a permanent occupation, and not the business of dealing in mining stocks, whether fancy or otherwise, much less that of organizing schemes for visionary and fraudulent purposes, whereby legitimate mining has hitherto been hurt and scandalized, through the odium excited by the reckless speculations and shameful impositions practiced in its name. Happily, the public is now too well advised of these sharp and fraudulent practices to render precautionary advice necessary; none but the most stupidly ignorant or wilfully blind being any longer liable to become their victims.

If, then, the adventurer, having discarded all speculative aims, desires to pursue the occupation of placer mining, he will do best to seek the more northerly group of counties, comprising Placer, Nevada, Yuba, Butte, Sierra, and Plumas. If a novice, and without means, it will generally be found expedient for him to work on wages, until such time as he has become familiar with the modes of operating, and acquired some knowledge as to the character of the different kinds of deposits, their methods of occurrence, and the rules to be observed in prospecting for or searching after them. With this knowledge and experience gained, he may proceed to take up claims for himself, if, as is generally the case, any of sufficient value can be found to justify locating ; or, having earned some money, he may now buy an interest in grounds previously secured by other parties, and which, if not already developed to a productive condition, may have been sufficiently prospected to enable him to form a tolerably accurate estimate of its value.

Once an owner in even a passably good piece of ground, the miner, unless his luck happen to be unusually bad, will be able to make ordinary wages—say from three to four dollars per day—his earnings, where purchases are made, generally being in proportion to the amount of money invested. In buying a part interest, or the whole of a claim, the price paid varies, of course, with its supposed value—ranging from a few hundred to quarter of a million dollars, or more—there being many of these properties, and even individual interests therein, that could not be bought for the latter sum.

The amount of labor and money required to open a claim not already developed varies widely, according to its situation and character—being, moreover, in many cases dependent on conditions that cannot be judged of accurately beforehand. Thus, the cost of opening some of the more expensive of the ancient river bed and blue gravel claims has varied from $100,000 to $200,000—the expenditure upon very many of them having been between $50,000 and $100,000—and the time consumed in the prosecution of the heavier works having ranged from two to ten years. These, however, are the most difficult class of placer claims to open—the next, in point of expense, the hydraulic, costing much less, except where long bed rock tunnels may be called for. Where these are necessary the time and expense required for their construction are often very great. These hydraulic and gravel claims constitute, however, the best openings for enterprise in this department of mining, where ample capital is at command, or where sufficient labor can be associated for their successful prosecution. Where this is not the case, there still remains to the miner a broad scope of shallow placers found generally on the lower foothills, and sometimes quite out on the rolling prairies that skirt the great interior valleys. The auriferous soil here is not usually more than a few feet deep ; their great extent. and the extreme facility with which they can be opened and worked, compensating for their want of depth. In the winter, when water can be had free or at little cost, a great portion of these diggings can be made to pay fair wages. They are generally open to location, or where taken up, can be bought at nominal prices. Where supplied with permanent and cheap water they can be steadily worked with remunerative results, though only in a few localities can these conditions be met. Every year additional water is being brought upon them by means of new ditches, and the business of working them is likely to increase gradually hereafter, as they must always be in favor with men of small means.

The river bars and banks, and the auriferous gulches which formed the scene of the early miners' toils, are now well nigh exhausted, having been worked over so repeatedly as to no longer reward the labor of washing. The river bed claims, like those above mentioned, have also in many instances been stripped of their contents; and where they have not, besides being expensive and precarious, are generally monopolized to an extent that leaves few chances for outsiders getting hold of them to advantage.

A style of mining, or rather an additional method for saving the gold that before was lost, introduced sometime since, has latterly come largely into use. It consists of what is known as tail sluicing and is practiced as follows: A cañon, or ravine, is selected through which extensive hydraulic claims discharge their tailings. Along this, a broad sluice, varying in width from six to twenty feet, is laid down, being generally constructed in two compartments, that one may be kept in use while the other is being cleaned up. These sluices are always of as great length as circumstances will permit, being from a few hundred feet to a mile or more long—one being at present in process of construction by the Palmyra Mining company, which, when complete, is to have the unusual length of six miles. It is being laid down in Missouri and Greenhorn cañons, Nevada county, the outlet of a group of the richest and most extensive hydraulic claims in the State. It is generally estimated that less than two thirds of the gold is saved by the process of hydraulic washing, the balance passing off with the tailings, in the shape of extremely fine particles, which, owing to the strength of the current, elude not only the riffles and other appliances, but also the quicksilver placed in the hydraulic sluice. These particles can only be arrested where the current is slower, and the distance they have to travel is increased, giving them a better chance to settle—all of which is accomplished by the tail sluice at little cost after it is once constructed, the owner being at no expense for water, quicksilver, powder, or other material for breaking down the earth or saving the gold, and but comparatively little for labor, since the only attention it requires for weeks, or even months at a time, being to keep it from becoming obstructed, and to clean it up at the end of that period.

As these tailings, after passing from the grounds of the hydraulic miner, are free to whoever may choose to claim and take the means to secure them, and as it is found that they can be made to yield fair, and often large profits, the business is likely to present many good openings for men of industrious habits and small capital. At present there are thought to be numerous unappropriated cañons where money could be made at tail sluicing, while the increase of hydraulic washing must constantly add to these opportunities. There is also a likelihood of continued improvements being introduced in the methods of operating, whereby a larger percentage of the gold passing off with the tailings will be saved, rendering it profitable to work them much more extensively than at present. The loss of the precious metal is still enormous, owing to the extremely comminuted particles escaping, as the sluicing is now performed. Hereafter, it may reasonably be expected that, through the application of more effective mechanical inventions, and perhaps, also, of chemical appliances, operations in this branch of mining will undergo a marked expansion.

And so in other departments of the business, with the introduction of new improvements and inventions, similar progress will be made—all the more important and permanent branches of mining having, with the progress of time, undergone steady enlargement. Auriferous deposits that a few years ago were overlooked as worthless, now give remunerative employment to large numbers of laborers. Quartz that could not, at one time, be made to defray cost of extraction, is now making millionaires of the fortunate owners; while tailings that were suffered to run to waste, having given rise to a new branch of mining, are, as we have seen, now being washed with largely accruing profits.

And thus, in canvassing the future prospects of the gold mining interest of this State, we are warranted in presuming that it will continue to experience large and constant expansion through the application of the same means that have hitherto worked these results; while the business of exploring for new mines, both in quartz, the ancient river channels, and in hydraulic deposits, will, no doubt, lead to important discoveries in every direction—the field of labor, from whatever point viewed, appearing almost illimitable, and the future full of encouragement and promise.

In speaking of the improvements and discoveries made on a grand scale, and which look to the general advancement of mining, it is not intended to convey the idea that these isolated cases of success, denominated "big strikes," which marked the early miner's career, no longer happen. Though not so numerous as formerly, they are still of frequent occurrence ; a reluctance to add unnecessarily to his income tax, and other prudential motives, restrain the miner from making these lucky incidents known so freely as before. Many of them, however, still come to light—the newspapers published in the mining regions constantly recording these instances of individual success, showing that the era of big nuggets and "rich pockets" is by no means over in California.

The revenues accruing to the owners of the larger and more lucrative hydraulic and gravel claims are often very large, varying from twenty thousand to one hundred thousand dollars, and upwards, per year. Thus, we find that one individual reports an annual income, derived chiefly from a single gravel claim in which he is part owner, of $102,000. Four persons, residents of the small mining camp of Timbuctoo, give in an aggregate yearly income of $109,000, derived from a hydraulic claim of which they are joint owners. These parties were all but a few years since poor, hard working men, having opened these now largely productive claims principally with their own labor.

How enormously some of these grounds pay may be inferred from the sums expended by the owners for water supplies annually ; thus, the water account of the Babb company, at Timbuctoo, for the past three years, reaches the sum of $90,000—the Michigan company, near by, having, during a like period, expended for this item a still larger sum. Another company at this place, having already paid out on this account $120,000, will have to incur a still larger expenditure before their ground is exhausted. A cluster of hydraulic claims on the Big Blue Lead, Nevada county, all within a compass of a few square miles, pay an annual rental for use of water of nearly half a million dollars—there being many other mining camps in that section of the State where proportionally large sums are expended for a similar purpose.

## QUARTZ MINING.

The examples of extreme large results obtained in this branch of mining are less frequent than in the hydraulic and gravel diggings, it being generally marked by a steadier and surer, though more moderate success than the other. Without attending to the extremely rich and generally limited deposits of quartz that have heretofore been found in certain localities, as at Carson Hill and elsewhere, and from which millions of dollars have in a short time been extracted, thousands of dollars worth having been sometimes thrown out at a single blast, or stopping to dwell upon the workings of a few exceptionally rich veins, such as the Soulsby and Allison Ranch, it will be our business at this time to briefly consider the average results attending the practical every day working of quartz in this State.

It has already been explained, that there is one leading vein, or rather system of veins, running longitudinally across, and very near the centre, laterally considered, of the great gold bearing belt of California—that there are other subordinate groups of veins running parallel to, and on either side of this main one, the distance separating them varying in width from two or three to ten or fifteen miles, the intervening space also frequently containing valuable lodes and masses of quartz—that the most largely productive and permanent deposits of auriferous rock are usually found along these parallel ore channels—and, finally, that the gold bearing rock, or ore, occurs along the same in bunches, known as "chimneys," or "chutes," being very unevenly distributed, and, so far as known, without much reference to regularity or system, some portions of these veins being rich in the precious metal while others are barren—even all semblance of a lode for long stretches entirely disappearing. This grand central vein is often denominated the "mother lode," or, in the Spanish, the "Veta Madre," meaning the predominating lode or ore channel of the country. In stating that this mother vein is more largely productive than any others, it is meant that it affords a greater amount of pay rock—not that it is richer, it being in fact below the average grade of California quartz. The reason that the mines situated upon it pay better than those elsewhere, is not only that it turns out much greater bodies of ore, but the latter can be extracted at less cost than from narrow lodes, encased in harder varieties of metamorphic rock.

With this much premised, it will be understood that the operations of quartz mining and milling are confined mostly to certain belts of country ; though occasionally very extensive and profitable fields for carrying on the business present themselves in regions far removed from the mother lode, the northwestern group of counties furnishing a case in point ; while the Meadow Lake country, lying on the summit of the Sierra, supplies an example of promising quartz mines, in what is termed an "outside" district.

## NUMBER OF LOCATIONS—EARLY EFFORTS.

There are 472 quartz mills in this State, carrying a total of 5,120 stamps—the whole erected at an aggregate cost of about $10,000,000.

In regard to the number of mining claims located and held under compliance with local laws, it would be impossible to form even an approximate estimate, as new locations are being constantly made and old ones abandoned. It may be said, however, that the company locations, embracing from two or three to twenty or more individual claims, can be numbered by the thousand; even what are considered separate lodes being very numerous.

For several years at first, and up till 1856 or 1858, nearly all the quartz operations undertaken in this State proved failures; the high prices of labor, freights and material, and above all, a total ignorance of the business having been the principal causes contributing to this result. During the past ten years, however, these conditions having been steadily changing for the better, we find that this pursuit, established on a solid footing, may justly be accounted one of the most safe, profitable and prospectively permanent of all these great industries that underlie and impart steadiness to so many subordinate occupations and interests.

It is not our purpose in this place to speak in detail of the business, or to enlarge on isolated cases of success or failure; all that can be done in the limited space at command being to allude in general terms to certain classes of operations, and the results that have attended them.

## PRESENT RESULTS.

Beginning at the southern end of the great auriferous range, we find there are in Tulare and Kern counties thirty quartz mills, carrying an aggregate of two hundred and sixty-five stamps, all but five of these mills being in the latter county, and a majority of them in what is known as the Clear Creek district. The veins here are numerous and of medium size, varying from two to six feet in thickness. The ores above the line of permanent water carried mostly free gold; and as but little trouble was encountered in their treatment, these mines were, for the first few years after the introduction of mills, worked with marked success; the advantages for cheap reduction, with the exception of high freights, being moderately good. After reaching the sulphureted ores, however, so much difficulty has been experienced in their management that not more than one quarter of the mills in that region have been running for the past two years, the product of bullion having meantime fallen off in a corresponding ratio. With the trouble of working the sulphurets once mastered, as it no doubt will be, this must again become a prosperous district, as the veins carry a fair per centage of gold and give satisfactory evidence of permanence.

Concerning the lodes and milling operations in Mariposa county, the next quartz mining district coming north, and separated from Clear Creek by a space of nearly two hundred miles, so much data has been presented elsewhere in this volume, that only a few facts of general purport will be here introduced.

The ores of the Princeton, the leading mine in this district, and one of the first opened, having been worked as early as 1852, yielded a short time as high as $75 per ton, this being while the workings were confined to the decomposed sulphurets near the surface. Subsequently, and up till 1864, the ores yielded an average of $18.34 per ton, the cost of raising ores having been $6, and the milling $3.25 per ton, whence, it appears, that a net profit of nearly fifty per cent. accrued. In the latter part of 1864, the yield suddenly dropped to $6 per ton, then again increased until the mine is now yielding a profit, though by no means so large as formerly. The main shaft has reached a depth of nearly seven hundred feet, and it is probable that further sinking will reveal new bodies of valuable ore, such having, under similar circumstances, frequently been the experience in this State. A number of examples could be cited in which the yield of gold having fallen below a remunerative point, has again been restored to its former standard, upon the lode being exploited to greater depths. In almost every extensively worked vein, zones of barren quartz may be expected to occur both on its vertical and longitudinal extensions, yet no experienced miner ever thinks of abandoning it where other characteristics of permanence are present. The Princeton ores have been reduced at a twenty-four stamp steam-mill, erected in 1860, at a cost of $40,000, and although this property has suffered much from mismanagement, the ores having for a long time been treated in a wasteful way, and large sums having been uselessly expended upon it, it is still considered valuable, there being scarcely a doubt but the ores under persistent exploitation will so far improve that fair profits will again accrue from their working. The aggregate product of this mine approximates the sum of $3,000,000.

Located near the north end of this county, belonging, like the Princeton mine, to the Fremont estate, and like it worked from a very early period, are two veins, known as the Pine Tree and the Josephine, both of which, after undergoing fluctuations similar to the Princeton, are now, with the employment of a new method of amalgamation, giving good returns—the ore crushed yielding an average of $30 per ton, whereby a large margin is afforded for profit. Under the present administration, this property, including two first class mills, which at one time had depreciated to a mere nominal value, promises to become largely and permanently productive.

As these several mines are supposed to fairly represent the class of larger veins in Mariposa, it will not be necessary to go into an individual description of the character and workings of the latter, the most of which could, no doubt, with a much less expenditure of money, be made to yield revenues equal to those now being derived from the Pine Tree and Josephine. Of the smaller class of veins in this county, which are quite numerous, many have been made to pay large wages, worked by arastras, a favorite method of operating among the Mexicans, who have been most largely engaged in the business.

In Tuolumne county, the App, Dutch Claim, Rawhide Ranch, and a few other leading veins, heretofore freely commented upon, may be accepted as representative mines of the county. Further north, in Calaveras and Amador, several groups of valuable veins present themselves at Carson Hill, Angel's Camp, Volcano, Sutter Creek, and other points along the mother vein; some of which, under a system of thorough development, have been brought to a highly productive condition; fully illustrating the importance of a persistent and intelligent application of means in the exploration of this class of mines.

Of all this number of mines, that belonging to the Amador Company, situated at Sutter Creek, is the most noteworthy, being in fact one of the most valuable pieces of mining property in the State. From a recent report on this mine made by Messrs. W. Ashburner and Henry Janin, Mining Engineers, it appears that the main working shaft has been sunk to a depth of 1,109 feet on the vein, which inclines at a mean angle of 71°, being equivalent to a vertical depth of 1,049 feet, making it the deepest shaft in the State. The claim of this company embraces two main lodes, the Eureka, from twelve to twenty feet wide, and the Badger, from one and a half to three and a half feet in width.

The gold here, though mostly free, being but little associated with sulphurets, is so generally disseminated throughout the rock as to be rarely visible to the naked eye. The only sulphuret present, that of iron, occurs in the small proportion of only one half of one per cent. The average yield of the entire body of ore taken from this mine, having been about $14 per ton for the previous ten years, returned at the rate of over $20 per ton during the fifteen months ending with February, 1868; the improvement, which had been constant as greater depth was attained, throughout all this time, having been very marked during the past year and a quarter, the best ore coming from the lowest levels of the mine. The ore recently raised from the deepest point reached on the Badger lode paid at the rate of $95 per ton. It shows more free gold than that taken from any other portion of the mine, carrying at the same time a larger per centage of sulphurets.

Taking the earnings of the past year, which it is believed can be steadily kept up, as a guide, the following results may be counted on as likely to attend the future workings of this mine: Quartz raised monthly, 1,800 tons; average yield, $20.04 per ton; cost of milling and mining, $6.04 per ton; net profits, $14 per ton; total monthly product, $36,000; expenses, $10,800; clear profits, $25,200—giving for net annual earnings $302,400. The Company own two mills, the Eureka, carrying forty, and the Badger sixteen stamps, and having a joint capacity to crush sixty-five tons of rock daily, a quantity far less than the mine might easily be made to supply. The net value of the reserves, being such bodies of ore as may be said to be already in sight, is estimated by Messrs. Ashburner & Janin at $847,653—sufficient with the present reduction capacity to keep the company's mills engaged for several years to come.

It should be remembered that the prospects of this mine were anything but auspicious at first, some of the early owners having given it up in despair. For many years the ore extracted was of too low grade to cover cost of raising and reduction; and but for the pertinacious efforts of a single individual, with little other means than his own labor, it would, most likely, have been abandoned during the earlier stages of its development as being utterly worthless. The principal object in presenting the foregoing details has been to exemplify the conditions upon which success in this department of mining is sometimes dependent, and to impress upon those engaged in its prosecution the necessity that exists for the exercise of the most unyielding perseverance and energy.

## MINES AND MINING AT GRASS VALLEY.

Although there are in both El Dorado and Placer counties many valuable veins of quartz, with numerous examples of successful mining and milling operations, there are here no such clusters of productive claims as are found at Grass Valley, or instances of long continued and marked success as is furnished by the Amador, the Sierra Buttes and various other mines in the more northerly counties; wherefore, it can be thought no disparagement to the many excellent mines within their limits that so little has been said of them in a review so salient.

As at Grass Valley, operations in quartz mining were first inaugurated, so have they since been conducted here with greater steadfastness, energy and general success than at any other point on this coast. In what has been done here we have an epitomized history of the business—of its vicissitudes, good fortunes and reverses in California. Hence, in treating on this topic, that place is apt to be selected for remark, since the experience had, here more fully exemplifies the whole subject than that of any other locality in the State.

It is still problematic whether the greater productiveness of the mines at Grass Valley is due more to the large amount of well directed labor and the amplitude of the means employed in their development, or to their inherent and absolute superiority. Should it be owing to the former, their citation as an example of what may be accomplished through these agencies, will serve our present purpose all the better—it being simply to enforce upon every one, whether already engaged, or who may contemplate engaging in the business of quartz mining, the imperative necessity that exists for unrelaxed effort until results entirely determinate are arrived at.

Labor on the lodes at Grass Valley, begun in 1850, has been continued without interruption since. Passing over the earlier years of the business, which even in this favored locality were full of disaster, we find that the yield of the quartz mines has for a number of years past been at the rate of about $3,200,000 per annum, which, there being a little upwards of 2,000 men employed in the mines and mills there, would give an average yearly production of $1,600 for each workman. The total gold product for the last fifteen years is estimated at about $30,000,000; a single lode, that running through Massachusetts and Gold Hills, upon which several company claims are located, having, prior to 1865, yielded $5,000,000 worth of gold. There are twenty-three quartz mills in this district, carrying an aggregate of a little over two hundred and eighty stamps, and having a capacity to reduce nearly one hundred thousand tons of ore annually. Twenty of these mills are propelled by steam, and three by water, the whole having cost about $500,000. The lodes here are narrow, none of them exceeding seven feet, and many being less than one foot wide. But they are distinguished for the uniformly high grade ores they carry, the latter averaging between $30 and $35 per ton. They contain a large per centage of sulphurets, which contributes with the narrowness of the veins to render the average cost of extraction and reduction high—about $15 per ton.

### A REPRESENTATIVE MINE.

Without referring to the Allison Ranch, Eureka, and other of the older and heretofore more prominent companies at this place, with the operations of which the public are already tolerably well acquainted, we will present at this time a few leading facts bearing upon the working of mines with which they are less familiar. Of this class is the property of the North Star Company, now thoroughly opened, and of great prospective value. The main working shaft on this mine has been sunk to a depth, on the incline, of nine hundred feet, being equivalent to a vertical depth of three hundred and two feet, operations being in progress for the opening of still lower levels. A vertical shaft has also been projected, to have a depth of four hundred and fifty feet, which, when completed, will tap the vein six hundred feet below present workings, following its slope, affording ores for many years to come—this company having always observed the wise policy of keeping exploration well in advance of requirement. This lode, but about one foot in thickness in the croppings, has increased to two and a half in present lower levels, the ore having steadily undergone a corresponding improvement. Although work upon the North Star lode was commenced at an early day and kept up without intermission, it supplies a notable example of a mine paying all expenses of exploration and improvements, and making large dividends, without ever having levied an assessment. The force now employed consists of one hundred and fifty men ; the improvements are a sixteen stamp steam mill, powerful hoisting works, and all other aids and apparatus usually appurtenant to a first class mill and mine. The product of the North Star for the four years ending January 1st, 1867, amounted to $842,100, it having yielded dividends at intervals for upwards of seventeen years. The net profits realized during the past nine years have amounted to over $600,000. The gross earnings of the mine for the past two years have been at the rate of about $26,000 per month—the net profits varying from $10,000 to $12,000 per month.

Vast masses of ore remain in the reserves, or backs, opened by drifts from the main shaft ; a large portion of the vein above the three lower levels being virgin and unbroken. The plan of letting out all underground work by contract having been first introduced by this company, and found to operate to the satisfaction of all parties, the system has since been adopted by other companies to an extent that promises its general introduction throughout the State.

There are many other companies engaged in quartz mining and milling at Grass Valley, and of whose operations and properties the general public hear but little, but who are able to make showings very similar to this exhibit on the part of the North Star Company; the case of the latter having been presented more fully, merely as indicating what is being accomplished by no inconsiderable number of mines at that place.

## BUTTE, SIERRA AND PLUMAS.

Although we do not find in either of these counties any great or extremely active quartz mining center, still, each contains a large number of mills, with many productive and a vastly greater number of undeveloped but promising mines, the greater attention paid to the placers having tended to retard this branch of mining. Though this class of operations have here been much restricted, the average success, so far as they have gone, has been not greatly behind that at Grass Valley; the product of one or two claims in Sierra having been second only to that of the best mines in Nevada county. Among the more noted examples of success in this region, is that supplied by the workings of the Sierra Buttes Mine, the locality and general features of which are elsewhere partially described in this work. This vein, which is inclosed in a hard metamorphic slate, varies in thickness from six to thirty feet. In process of extraction, only the richer portion, consisting of a streak about twelve feet thick lying next the foot-wall, is removed. The lode has now been worked to a depth of over eight hundred feet, the ore from the lower levels paying as well as that nearer the surface, though, owing to extensive decomposition, the croppings paid better than any other portion. After getting below the point to which atmospheric and similar influences had extended, the ore has undergone but little variation, having given an average yield of about $14 per ton. This valuable property was first located in 1851, though little was done upon it until 1854, from which time until 1857 the croppings were worked at intervals with arrastras, yielding a gross product during this period of $175,000, and a net profit of $80,000. During the latter year a Chili mill and several additional arastras were put up, the running of which resulted in a corresponding increase of earnings. In 1858 an eight-stamp mill was erected, followed in 1860 by two additional twelve-stamp mills.

The following table exhibits the gross earnings and net profits of this mine for the past eleven years:

| | Gross Yield. | Profits. |
|---|---:|---:|
| 1857 | $51,000 | $36,000 |
| 1858 | 55,000 | 40,000 |
| 1859 | 88,000 | 68,000 |
| 1860 | 120,000 | 83,000 |
| 1861 | 198,000 | 154,000 |
| 1862 | 164,000 | 112,000 |
| 1863 | 158,000 | 100,000 |
| 1864 | 90,000 | 15,000 |
| 1865 | 198,000 | 132,000 |
| 1866 | 223,000 | 144,000 |
| 1867 | 180,000 | 105,000 |
| Prior to 1857 | 175,000 | 80,000 |
| Totals | $1,700,000 | $1,069,000 |

The quantity of ore crushed during this time approximated 130,000 tons. The cause of the decline in the product of 1863–64, was insufficiency of water to run the company's mill, compelling the building of a flume at a cost of $40,000, to bring in an additional supply.

## GOLD-BEARING SLATES AND GOSSANS.

About the year 1860 attention began to be directed for the first time to a species of auriferous deposits discovered in the copper bearing range adjoining the main gold belt on the west. The first claim of this kind taken up was at Quail Hill, in the Gopher Mining District, Calaveras county, it having been located for copper during the prevailing excitement about that metal in the year above mentioned. Subsequently, over 150 tons of copper were shipped from these grounds, consisting chiefly of the green and blue carbonates, containing about $50 value per ton of the precious metals, and averaging thirty-two per cent. of copper. The superficial area of the claim comprises a parallelogram 1,800 feet long, and 600 feet wide. This deposit, which exhibits strong croppings, is, in its upper portions, a regular gossan, stained everywhere with the oxide of iron and the carbonate of copper, giving it a peculiarly variegated and rusty, or ochreous appearance. The explorations made upon it sufficiently disclose its character, probable value, and extent—enough having been done to prove it an ore channel at least three hundred feet wide, and probably of a much greater width. Its contents, so far as exposed, consist wholly of the decomposed metallic sulphurets, which, mixed with spongy white quartz, talcose and chloritic rocks, rotten porphyry, heavy spar, etc., are all so thoroughly decayed as to yield readily to the pick, rendering their removal a matter of little expense. The original vein, of gigantic dimensions, seems to have been highly charged with the sulphurets of copper and iron, both of which, as well as the gangue itself, having become impregnated throughout with the precious metals. Almost every part of this decomposed mass, including the rocky croppings, when pulverized and washed, yields a fair "prospect" of free gold.

These grounds have been somewhat extensively prospected by means of various pits, open cuts, tunnels and shafts; all of which, though some of the latter have been sunk to a depth of over one hundred feet, continue in highly productive material, indicating that nearly the entire mass can be worked with profit.

The company owning this mine erected upon it a twenty stamp mill, in the autumn of 1867, for the purpose of reducing its contents. For several months at first the yield did not exceed three or four dollars per ton, which, however, as the cost of extraction and crushing was small, still left some margin for profits. Subsequently the character of the material grew better, having undergone such marked improvement that the yield in February, 1868, averaged over $9 per ton, enabling the company to pay at that time a monthly dividend of $4,000, a rate that it is believed can be not only kept up, but steadily increased hereafter, a better grade of ores having been developed as greater depth was attained. The cost of mining and milling here is but $2 50 per ton, the gold being easily saved by amalgamation in the battery and the use of blankets, no other apparatus or process being necessary to its thorough extraction.

The present working levels are now over one hundred feet below the surface, at which point the mass of pay matter has not only increased in richness, but seems to maintain its original dimensions, as well as its decomposed and ochreous character. Some excavations recently made at a higher level have also revealed richer deposits than had previously been found in the upper works.

This company, besides their mine, are owners of a very valuable water franchise and works, consisting of a large reservoir and over twenty miles of canals, affording water ample for the use of the adjacent mining region, with sufficient to spare, for one thousand stamps, driven by steam. Their entire expenditure in the purchase and improvement of this property has amounted to $190,000, which large sum is generally considered to have been an excellent investment, present earnings paying good interest on that amount—while with an increase of working capacity the net product of the mine could be materially enhanced.

Similar beds, or ore channels, filled with these gossans, have been found elsewhere in the State; one of which, known as the Banker, or Harpending claim, located near Lincoln, Placer county, was, for a portion of the year 1866, successfully worked with a five-stamp mill. At this point, in a small round hill, rising about one hundred feet above the adjacent plain is imbedded the metalliferous mass, about two hundred feet wide, and five hundred feet long. Here, mixed with the decomposed quartz and pyrites, is a talcose rock—nearly the entire body of which exhibits small quantities of free gold, when washed. This mine has been opened and worked like a quarry, the whole of the material being crushed without much selection. Owing to the facility with which it can be removed and pulverized, the cost of mining and milling is small—from five to six tons being run through, to each stamp, every twenty-four hours. A number of capitalists, purchased a controlling interest in this mine in 1866, and erected a forty-stamp mill, which has since been running, at intervals, on these ochreous gossans with fair results.

## AURIFEROUS CEMENT AND GRAVEL BEDS.

A brief allusion to this class of deposits will close our description of the various branches of gold mining in California. Concerning the origin and extent of these beds, their position and modes of exploitation, so much has already been said that it only remains to notice one or two of what may be considered leading claims, with a view to a more full elucidation of their permanence and productiveness; to which end, what is known as the Blue Gravel Claim, at Smartsville, may be taken as an example of the difficulties to be encountered in opening these grounds, as well as of the liberal rewards that often attend the successful issue of such undertakings.

Work upon this claim, involving the necessity of constructing a long and costly drain tunnel, was commenced in 1853, the capital of the parties undertaking it consisting chiefly of their own labor. During the first nine years there was washed out $315,489, all of which, with a further sum of $7,543, standing against the company as indebtedness, was absorbed by current expenses. In March, 1864, the main tunnel having been completed, the claim began to yield enormously, having turned out, during the following forty-three months, $837,409, of which $625,543 were net earnings; $564,500 having been divided among the owners as profits, and $61,043 meantime expended for improvements. The average monthly outlay during this period, for labor, material, and all other causes of expenditure, except such as should properly go to account of capital, was less than $5,000.

The evenness with which the gravel here has paid indicates that the gold is distributed throughout it with great uniformity; arguing that this claim will continue to pay equally well for many years to come, there being a vast amount of auriferous earth and gravel yet to be washed. The quantity disposed of to obtain the foregoing results approximates 1,600,000 cubic yards ; the yield of the upper portion, or white cement, constituting less than one-third of the entire mass, having been at the rate of $0 50.67 per cubic yard, and that of the lower stratum, or blue gravel, at the rate of $0 84.66 per cubic yard. The sums paid for water during these forty-three months, amounted to $57,261, being at the rate of fifteen cents per miner's inch.

The American Hydraulic Company realize from their gravel claim at Sebastopol, Nevada county, an annual net revenue of $65,000; and although the cost of opening their claim has been small compared with that incurred by the Blue Gravel Company, they have a valuable property, owning sufficient ground to keep their sluice profitably employed for a long time to come. It is estimated that the gold washed from a group of hydraulic claims situated at Quaker Hill, You Bet, and other small mining camps in the vicinity, has since their first opening amounted to over $15,000,000. The Granite Company, washing by hydraulic pressure at Birchville, Nevada county, averaged a gross yield during the past winter and spring of $150 per day; the Kennebec Company, at the same place, $250 ; and the Buckeye, $500. At French Corral, near by, Eddy & Co., took out $30,000 in a run of one month; while the Dockum Company, operating at the same place, have cleared $33,000 within the past two years. These are not cited as extreme cases, but as instancing about what are the average results obtained from the better class of claims in that section when they are once opened, and of which there are a large number in Nevada county.

## OPENINGS FOR ENTERPRISE, LABOR AND CAPITAL.

From the foregoing facts and well verified statements the following conclusions seem fairly deducible: that the chances for making money in the mines of California are, to the industrious, frugal and patient, nearly as good now, everything considered, as they were fifteen or sixteen years ago; that the inducements for immigration, more especially for mechanics, common laborers, and others desirous of hiring out their services, are great—the scale of wages ranging from sixty to ninety per cent. higher than in the Eastern States, and more than a hundred per cent. higher than in the best paid labor markets of Europe—and, finally, that the opportunites presented for the safe and profitable investment of capital are vastly better in the mining regions of this State than can be found in any other country in the world.

We have already sufficiently indicated the best modes of procedure, and the most eligible fields for such as desire to engage in mining on their own account. To such as prefer hiring out their labor, it may be said, that good hands are always in demand in the mines at about the following rate of wages, the prices paid varying somewhat with the kind of work to be done and slightly also with locality, there being a tendency to higher rates the further we go north: For those engaged in underground and otherwise extra laborious, disagreeable or dangerous work, $3 to $3.50, and sometimes as high as $3.75 per day, or from $75 to $80 per month; for ordinary work, $2.75 to $3 per day, and from $60 to $75 per month, the miner in all cases boarding and lodging himself, which will cost at the rate of about $25 per month, or a little less, if he board himself, as many of this class do, owning their own cabins and often a sufficient plat of ground around them to raise all the fruit and vegetables they may require. In working by the day no time need be lost in the summer by reason of bad weather, nor is the per centage large at other seasons except in districts so elevated that placer operations are interrupted by the frost and snow. In few other countries is the time necessarily lost from this cause so small as in California. The advantages of the climate, the beauty and healthfulness of the country, and the great excellence and abundance of everything essential to subsistance having been amply expatiated upon elsewhere in this volume, will not be further noticed in this place.

So also of questions relating to the investment of capital, so much has already been said that it only remains to be observed that every year's and every month's experience tends only to confirm the opinions expressed everywhere in this work, to the effect that the gold mines of California present incomparably better openings for the safe and profitable expenditure of money than any other field of investment to be found. No active pursuit promises anything like the returns, while none can be more free from fluctuations and contingencies than this species of mining properly conducted in this State, at the present day. The most numerous examples of rapidly accumulated fortunes are found among the miners ; the largest revenues are enjoyed by this class, and in them is vested the ownership of the most valuable non-productive properties in the State ; many of their number being already rich, and not caring to develop the same—satisfied that their constantly increasing value will render the sums expended in their purchase and partial improvement a safe and remunerative investment.

While gold is the principal metal now mined and by far the most valuable in the State, California contains a great variety of other kinds as well as of the useful minerals—the latter often in great abundance. Thus, we find here, silver, coal, iron, copper, quicksilver, borax, sulphur, salt, manganese, tin, and many other varieties of the metals and minerals of most economic use or greatest value in commerce.

## SILVER.

The various argentiferous ores abound in this State to an extent that, in the absence of a more precious metal, would distinguish it as a silver producing country. Already, the business of mining for this metal constitutes almost the sole pursuit of the inhabitants of three counties in the State, while, as is well known, valuable lodes of argentiferous ores exist in many other counties ; the principal deposits, so far as explorations extend, being in Calaveras, El Dorado and Shasta, and upon the Island of Santa Catalina, where it occurs very abundantly as an argentiferous galena. There are now twenty-two mills and reduction works, several of them of large capacity, employed in working silver ores in this State ; and it may fairly be presumed that with so great an extent of valuable mines, and so large a population engaged in the business, that the product of this metal will be very considerable in the course of a few years, when existing difficulties in the treatment of these ores shall have been more fully overcome.

## OF COAL, COPPER, BORAX, SALT AND SULPHUR.

So much has been said elsewhere in this book that their further consideration may be dismissed with the simple remark, that they are all growing in importance with the introduction of new branches of manufacture calling for supplies of these several articles, and with the general advancement of the trade and varied industries of the country, every year adding to the amount of their production and commercial value.

## IRON ORES.

The large and rapidly increasing consumption of iron in this State, together with the prospective requirements growing out of the construction of railroads and the present high prices of this material, render the question of home supply one of vital import. Deposits of ferruginous ores are known to exist in different parts of the State, but not generally under circumstances that would render their reduction profitable, or even practicable. Thus, there are numerous extensive beds in the Coast Range mountains, with others of less extent in the vicinity of San Francisco; but the absence of fuel, and often of sufficient water for smelting works, renders them of little or no value.

There is, however, a heavy accumulation of excellent ores at Gold Valley, Sierra county, situated under circumstances extremely favorable to large and cheap reduction, there being in the immediate vicinity an abundance of the finest timber and a sufficiency of water for all necessary purposes. These deposits, which are located about twelve miles east of Downieville, in the neighborhood of the celebrated Sierra Buttes Gold Mine, are owned by the San Saba Iron Mining Company, incorporated with a view to prosecuting the work of their practical development.

The ores at this point occur in a belt of metamorphic rock, being scattered over an area four miles wide and ten or twelve miles in length. They are of the magnetic variety, identical with that from which the best Swedish and Russian iron is made, and exist here under three different conditions: First, as an unmixed magnetic ore, so fine grained as to resemble the best of steel, and so pure that a large proportion of it will yield from sixty to sixty-five per cent. of metal. Then, there are masses of this magnetic ore mixed with carbonate of lime, while again it occurs associated with talcose slate, through which are diffused innumerable crystals of iron, the impurities in this case being of a kind not likely to interfere injuriously with the smelting process, while the carbonate of lime is present in about the proper quantity to supply the necessary flux. These two classes carry about fifty per cent. of the pure metal.

The deposits at this place furnish a notable instance of iron ores marked by an entire absence of arsenic, sulphur, phosphorous, and such other substances as tend to deteriorate the quality of the metal. The aggregate quantity of ore upon the tract owned by this company is immense; the outcrop of the ore chutes being from fifty to two hundred and fifty feet long, from twenty to two hundred feet wide, and projecting from twenty to fifty feet above the surface—it being estimated that a million and a half tons of first class ore can be removed from the surface deposits, worked as an open quarry.

The value of these mines is greatly enhanced by the facilities that exist for the reduction of their ores, being in the midst of heavy forests of pine and spruce, insuring cheap and unfailing supplies of charcoal for smelting, fuel for generating steam for motive power, and lumber for building; while a number of small streams near by can be made to afford all the water necessary for the reduction works, and, during a portion of the year also, for the propulsion of machinery.

As regards a market for their product, these mines are favorably situated, being in and adjacent to extensive mining districts, wherein the consumption of iron, already large, will hereafter become greatly increased, while the price of the imported article must always remain high. Meantime, the facilities for transporting this product to points where required will be all the while increasing, as new wagon roads continue to be built throughout the country, while the construction of the projected Feather River railroad will afford additional advantages in this respect—the line of this road, by the route contemplated, running within a short distance of this company's property.

With such valuable deposits of ore, so favorably situated for cheap reduction—with very considerable markets at present, and such a large prospective demand—it is highly probable that the erection of smelting works, already projected by this company, will be consummated, and the business of manufacturing pig iron be entered upon at an early day. That, if once inaugurated, this enterprise will prove alike advantageous to the proprietors, and beneficial to the country, can scarcely be questioned.

## QUICKSILVER.

While deposits of cinnabar occur at many points in California, the only mines yet developed to a productive condition consist of the New Almaden, the New Idria, the Redington, Guadalupe, and the San Juan Bautista—the first the earliest opened, and by far the most prolific mine in the State.

The work of opening and improving this mine, begun in 1846, was prosecuted during the following four years with considerable energy, having been attended with an expenditure of $978,114, and resulted in the accomplishment of considerable exploratory labor, in the erection of furnaces, and the extraction of metal to the value of $535,540—being $442,572 less than the amount expended.

The landed estate of this company consists of 7,800 acres. Many parts of this tract are traversed by veins of cinnabar, some of them traceable for long distances—indicating extensive deposits of this ore. The population employed in, or dependent on the mine, amounts to about 2,000 ; the company having at present 700 men on their pay roll, though at times the number is much larger. The capital stock of this company consists of 100,000 shares, of $100 each. The mine is understood to be in a prosperous condition, with an extremely promising future before it, the reserves of ore in sight being large.

The total product of the New Almaden mine, and the average percentage of metal yielded by the ore, during the last seventeen and a half years, are exhibited by the following table :

| DATES. | ORE CONSUMED. Pounds. | PERCENTAGE. | FLASKS. | POUNDS. |
|---|---|---|---|---|
| July, 1850, to June, 1851 | 4,970,717 | 35.89 | 23,875 | 1,826,437 |
| July, 1851, to June, 1852 | 4,634,290 | 32.17 | 19,921 | 1,523,956 |
| July, 1852, to June, 1853 | 4,839,520 | 27,94 | 18,035 | 1,379,677 |
| July, 1853, to June, 1854 | 7,488,000 | 26,49 | 26,325 | 2,013,862 |
| July, 1854, to June, 1855 | 9,109,300 | 26,23 | 31,860 | 2,437,290 |
| July, 1855, to June, 1856 | 10,355,200 | 20,34 | 28,183 | 2,155,999 |
| July, 1856, to June, 1857 | 10,299,900 | 18.93 | 26,002 | 1,989,153 |
| July, 1857, to June, 1858 | 10,997,170 | 20.05 | 29,347 | 1,245,045 |
| July, 1858, to October, 1858 | 3,873,085 | 20.05 | 10,588 | 809,982 |
| November, 1858, to January, 1861* | ........... | ...... | .......... | ......... |
| February, 1861, to January, 1862 | 13,323,200 | 18.21 | 34,765 | 2,659,522 |
| February, 1862, to January, 1863 | 15,218,400 | 19.27 | 40,391 | 3,089,911 |
| February, 1863, to August, 1863 | 7,162,660 | 18.11 | 19,564 | 1,496,646 |
| November, 1863, to December, 1864 | 25,646,100 | 16.40 | 46,216 | 3,535,524 |
| January, 1865, to December, 1865 | 31,948,400 | 12.43 | 47,194 | 3,610,341 |
| January, 1866, to December, 1866 | 26,885,300 | 11.62 | 35,150 | 2,688,975 |
| January, 1867, to December, 1867† | 26,023,933 | 7.05 | 24,461 | 1,871,266 |
| Totals | ............ | ....... | 461,887 | 35,333,586 |

The New Idria Mine, now worked with good judgment and economy, is giving a monthly product varying from six to eight hundred flasks—having turned out in the year 1866, 6,045 flasks, and in 1867, 11,500 flasks. The Redington Mine, for these respective years, yielded 2,980 and 7,145 flasks. Under a vigorous administration, the very extensive and high grade ores of this company are being developed with a skill and energy that promises large additions to its annual product. The yield of the Guadalupe Mine was 1,654 flasks for the year 1866, and 1,200 for 1867; the total product of the San Juan Bautista Mine having been 80 flasks for the month of December, 1867.

The principal markets for the surplus quicksilver product of California are found in China, Mexico and South America, the consumption in this State, and adjoining States and Territories being large. The product of the State for 1867, as above set forth, aggregates 44,386 flasks, of which 28,853 were exported, leaving for account of home consumption 15,533 flasks. Of this, China and Mexico, each, took 10,000, and South America 3,800 flasks, the balance being sent to different parts of the world. The disturbed condition of the countries, usually constituting our principal customers by diminished requirements in those quarters, has for a year or two past depressed prices, and to some extent restricted production.

* Mine closed by injunction.

† Ore on hand equivalent to 5,000 flasks.

## MINERALOGY.

The mineralogy of California presents some peculiarities that are worthy of note. Of the known mineral species, which now number about seven hundred, but little more than one hundred have been hitherto recognized on this coast. The paucity of silicates, and the absence of the "zeolites," elsewhere so common in the volcanic rocks, are very marked features. Fluorspar and barytes, which enter so abundantly into the composition of the vein stones of other mining countries, are of exceedingly rare occurrence, though the former is found, as will be seen by reference to the subjoined list, associated with the copper ores of Monte Diablo, and the latter is known to occur.

While the State of California is pre-eminent as containing within its borders a great variety of valuable ores, yet some, elsewhere common, do not exist here in sufficient quantity to be of economic value. For example, no considerable deposits of lead and zinc have as yet been discovered, except perhaps the galena occuring in uncertain quantity on the Island of Santa Catalina. In the Castle Dome district, on the Colorado river, in Arizona, there is reason to believe that valuable, and perhaps permanent mines, of a highly argentiferous galena exist. The Santa Catalina ores contain but a small amount of silver.

The similarity of our mineralogy to that of Chili has been noted, and adduced as proof of the unity of the Cordilleras of North and South America.

The following is a list of the principal mineral species hitherto recognized in the States of California and Nevada, and the adjoining territories, together with some of the localities at which they occur:

*Alabasta*—Los Angeles county.

*Andalusite*—In the drift of the Chowchilla river. In slates near Hornitos, Mariposa county.

*Antimony Ochre*—San Emidio mountain. (W. P. Blake.)

*Arsenic*—Alisal mine, near San Carlos Mission, Monterey county.

*Arsenical Antimony*—Ophir mine, Virginia City, Nevada.

*Arsenolite*—Armagosa mine, Great Basin. Ophir Mine, Nevada. (Genth.)

*Azurite*—Common among the surface ores of copper.

*Barytes*—Rare in California, but occurs in large granular masses at Quail Hill, Calaveras county.

*Biotite*—In vicinity of Grass Valley, Nevada County.

*Bitumen*—Abundant in the southern coast counties.

*Blende*—With galena, in the auriferous quartz veins of the State. No massive deposits have as yet been found in California.

*Borax*—Abundant in the waters of Borax Lake, Lake county, and in the mud beneath—frequently in crystals three inches across.

*Bournonite*—Said to occur in the ore of the Sheba mine, Nevada.

*Calcite*—Localities numerous.

*Cassiterite*—(Binoxide of Tin)—Temescal Range, about sixty miles from Los Angeles. Idaho Territory, on Jordan creek. State of Durango, Mexico.

*Cerusite*—Great Basin, near Mohave river, and incrusting galena from the mines of the Castle Dome district, Arizona.

*Chalcopirite*—(Yellow Sulphuret of Copper)—Occurs in various parts of the State; but in very large masses in Calaveras and Plumas counties.

*Chrysocolla*—(Silicate of Copper)—Copper mines of Arizona.

*Chrysolite*—Between the Pittsburgh and Pioneer Quicksilver claims, northwest of Mount St. Helena.

*Chrysolite*—Various localities.

*Chromic Iron*—Monterey county, near San Benito river. Near the New Idria Quicksilver mine. Alameda county, near San Antonio.

*Cinnabar*—Occurs abundantly throughout the Coast Ranges, and sparingly in the Sierra Nevada.

*Coal*—At Monte Diablo, Corral Hollow, and various localities in the State. At the former locality are the only beds known to be valuable. Lignite is found in various parts of the State.

*Cobalt Bloom*—(Erythrine)—Near San Luis Obispo, and elsewhere in the State.

*Coccinite*—(Iodide of Mercury)—Santa Barbara county. (G. E. Moore.)

*Corundum*—In the drift of the San Francisquito Pass. (Baron Richthofen.)

*Copper*—(Native)—At various localities in the State. From Copper river, Alaska, masses similar to those of the Lake Superior mines have been brought.

*Copper Glance*—(Vitreous Copper)—Occurs abundantly in Arizona, where it is usually argentiferous. Specimens from Plumas county, California, are said to contain as much as $200 in silver to the ton.

*Diamond*—At several localities in California. Idaho, on the Owyhee river.

*Diallogite*—(Carbonate of Manganese) occurs abundantly in the silver-bearing veins about Austin, Nevada. (W. P. Blake.)

*Dolomite*—In Amador county, in narrow, snow-white veins, traversing chloritic rocks, and bearing coarse, free gold. (W. P. Blake.) It is also associated with quartz

*Embolite*—Lander county, Nevada?

*Emerald Nickel*—With chromic iron, Monterey county? Near San Luis Obispo.

*Erubescite*—(Variegated copper)—Siegel lode, Plumas county.

*Feldspar*—In various species common throughout the State.

*Fluorspar*—Sparingly, in small white cubes, with copper ore, at Monte Diablo. (W. P. Blake.) Occurs abundantly with galena and blende in the lead mines of Castle Dome district, Arizona.

*Galena*—Occurs in most of the auriferous quartz veins of California; also at various points in the Coast Ranges. On Santa Catalina Island. Abundantly in the veins of Castle Dome district, Arizona.

*Garnet*—Various localities.

*Gay Lussite*—In a small salt lake, near Ragtown, Nevada. (B. Silliman.)

*Glauberite*—Found in the mud beneath Borax Lake; only locality in which it has been hitherto recognized in North America. (B. Silliman.)

*Gold*—In rocks later than the Palæozoic, throughout the State, but more particularly in the metamorphic belt of Triassic and Jurassic rocks on the western flank of the Sierra. Nests and bunches of octahedra, with beautifully brilliant faces, have been taken from the Princeton mine, Mariposa estate. In El Dorado county, at Spanish Dry Diggings, a mass of gold, made up of irregular dendritic crystallizations, and weighing sixteen pounds was found. Crystalline gold has been found in many of the hydraulic washings in the State. It occurs curiously associated with cinnabar and bitumen in Colusa county.

*Gold and Tellurium*—See *Tellurium.*

*Graphite*—Eureka Plumbago Company's mine, near Sonora, Tuolumne county; and elsewhere in California.

*Gypsum*—Various localities.

*Hayesine*—Occurs in globular masses, in layers alternating with those of salt, in Columbia Mining district, Esmeralda county. (R. H. Stretch.)

*Hematite*—Abundant in California ; perhaps the most important locality is north of Auburn, Placer county.

*Hessite*—In the gold drift, El Dorado county. (W. P. Blake.) In the Reist mine, on the great quartz lode, at Whisky Hill, Tuolumne county.

*Horneblende*—Throughout the State. The variety "asbestos," at many localities. Mountain cork, in Tuolumne county ; and tremolite in limestone in the same county.

*Hyalite*—With semi-opal, about thirty miles south of Monte Diablo. (W. P. Blake.)

*Hydromagnesite*—In the vicinity of the New Idria mines. (J. D. Whitney.)

*Idocrase*—Siegel lode, El Dorado county?

*Ilmenite*—El Dorado county, near Georgetown, from gold washings. (W. P. Blake.)

*Iridosmine*—With platinum and gold, in the beach sands of the northern counties. Found also as a residue in melting large lots of gold dust.

*Kerargyrite*—Localities numerous, particularly in the decomposed surface ores of the silver mines of Nevada, Idaho and Arizona. In California, in the mines of the Slate Range district.

*Limonite*—Common in California. In Oregon, near Portland, occurs in an extensive bed.

*Magnesite*—Occurs massive at various localities in the Coast Ranges. Associated with the quartz of the veins of California.

*Magnetite*—At various localities in the State. In extensive beds, massive, and of superior quality, in Sierra county.

*Malachite*—(Green Carbonate of Copper)—Abundantly in surface ores of the copper mines of the State.

*Mariposite*—A provisional name for a supposed new species, attached by Prof. B. Silliman to the light apple-green colored mineral, occurring with dolomite and quartz in the *Veta Madre* of California.

*Marcasite*—Localities numerous.

*Marmolite*—In the vicinity of the New Idria Quicksilver mines. (J. D. Whitney.)

*Mercury*—(Native)—In the "Pioneer claim," northwest of Mount. St. Helena, between Pine Mountain and Mount Cobb. It occurs frequently in globules in the silicious limestone, and sometimes in geodic cavities, in considerable quantities.

*Mispickel*—Commonly associated with gold in the auriferous quartz veins of California.

*Natron*—(Carbonate of Soda)—Various localities.

*Petroleum*—Abundantly distributed throughout the coast counties, from San Diego to Crescent City.

*Platinum*—With iridium and iridosmine, on the coast at Cape Blanco, Southern Oregon. Analysis of a sample of the mixed metals from Port Orford, in 1854, gave forty-three and fifty-four, and one hundred per cent. of platinum. (W. P. Blake.)

*Proustite*—(Light Red Silver Ore)—In the veins about Austin, Lander county, Nevada. At the Dancy Mine, and sometimes in the ores of the Comstock Lode, Nevada.

*Pyrargyrite*—(Ruby Silver)—In the silver mines of Nevada. It is particularly abundant in the mines about Austin, Lander county, Nevada.

*Pyrites*—Common throughout the State.

*Pyrolusite*—A very pure ore of Binoxide of Manganese occurs in considerable quantity on "Red Rock," in the Bay of San Francisco.

*Pyromorphite*—Occurs frequently in the auriferous quartz veins of the State that are marked by the presence of galena, as for instance, in the Primrose Mine, Sierra county.

*Pyrophyllite*—Occurs in the gold region ; locality not known. (W. F. Blake.)

*Pyrrhotine*—In California ; precise locality unknown.

*Quartz*—Fine crystals are obtained in the mines of California and Nevada. The vitreous, chalcedonic, and jaspery varieties are not uncommon in various parts of the State.

*Salt*—(Rock Salt)—Abundant as an incrustation throughout California. It also occurs in enormous quantities in the beds of dry lakes in Nevada.

*Sassolin*—(Boracic Acid)—Clear Lake, Lake county. (W. P. Blake.)

*Scheelite*—In the Mammoth district, Nevada. (Dr. C. T. Jackson.)

*Serpentine*—Abundant throughout the State.

*Selenite*—In shales of Lone Tree Cañon, east side of Monte Diablo range. (J. D. Whitney.)

*Silver*—(Native)—It is of comparatively rare occurrence in California, but found frequently in the mines of Nevada, Idaho and Arizona.

*Silver Glance*—Abundant in the silver mines of Nevada.

*Sphene*—In the granite of the Sierra Nevada. (W. P. Blake.)

*Stephanite*—The crystals have been taken from the mines on the Comstock lode, Nevada.

*Stibnite*—In large masses near the San Emidio Cañon, also in acicular crystals and granular masses at the Lake quicksilver mine.

*Stromeyerite*—Heintzleman mine, Arizona.

*Sulphur*—In large deposits at foot of Clear Lake. In considerable quantity at several localities in Colusa county, and at other points within the State.

*Tetrahedrite*—Occurs in the *Veta Madre* of California ; abundantly in the Sheba mine, Nevada.

*Tellurium*—Native, and associated with silver and gold, in some of the auriferous quartz veins of California. Native tellurium occurs foliated in a mine at Angel's Camp, Calaveras county. It is also associated with silver and gold in a mineral which is probably to be referred to a new species, containing more silver than gold. (B. Silliman, M. D., Dec. 2d, 1867.) It appears that Mr. G. Kustel had previously noted the peculiar composition of this mineral, in a communication to the *Mining and Scientific Press*, May 20th, 1865.

*Tourmaline*—San Diego county, north side of valley of San Felipe, in feldspathic veins.

*Tungstate of Manganese*—Mammoth District, Nevada. (Proc. Cal. Acad., III, p. 199, C. T. Jackson.)

*Wulfenite*—(Molybdate of Lead)—Found in small yellow crystals in the upper part of the California Mine, Comstock lode, Nevada. (W. P. Blake.)

*Zircon*—Occurs with garnets in mica slates of Monte Diablo. (Geology of Cal.; vol. I, p. 22; J. D. Whitney.)

# CHAPTER XI.

## MANUFACTURING INDUSTRIES.

Introductory Remarks. Woolen Mills : The Pioneer Mills—Mission Mills—Pacific Mills—Marysville Mills. Cotton Manufactures—Flouring Mills—Sugar Refineries. Iron Works: The Pacific Rolling Mills—Union Iron Works—Miners' Foundry, etc.—Boiler Works. Brass Foundries—Saw Mills and Lumber—Wire and Rope Works—The Pacific Cordage Factory—Tanneries—Powder Works—Fuse Factory—Paper Mills—Glass Works—Manufacture of Salt—Soap Factories—Candle Factories—Glue Factory—Chemical and Acid Factories—Matches—Oil Works—Rice Mills—Lime and Cement—Lead Works—Marble Works and Quarries—Potteries—Boots and Shoes—Saddlery and Harness—Wagons, Carriages, Cars, Agricultural Implements, etc.—Furniture—Matting—Pianos, Organs, Billiard Tables—Breweries and Distilleries—Brooms, and Broom Corn—Wood and Willow Ware—California Type Foundry—Cigar Manufactories—Manufacture of Clothing, Shirts, etc.—Furs—Meat Packing and Curing—Dried and Preserved Fruits and Vegetables, etc.—Miscellaneous Manufactures—Works Projected or in Progress.

The State of California possesses such marked and manifold advantages, aside from its geographical position, as to insure the rapid building up of large manufacturing interests within its limits. Foremost among these advantages is the vast and widely diffused water-power found in all the hill and mountain districts throughout the northern and eastern sections of the State. Extending along the western watershed of the Sierra, and following the lateral range that, near its northern end, sets off toward the coast, is a belt of country five hundred miles long and seventy-five miles wide, crossed by more than twenty large rivers, many of them formed from several forks—each, for a good portion of the year, a fair sized stream. Besides these rivers, there are many creeks flowing in like manner across this belt, and which, though not perennial, carry heavy bodies of water for at least one half the year. All these rivers have their sources about the summits of the lofty Sierra or its outlying ranges, whence they descend rapidly towards the great interior plains, a portion of them flowing directly into the sea ; many of them making a fall of more than six thousand feet in flowing a distance of seventy or eighty miles. The amount of propulsive power that may be generated by an entire and economical appropriation of these waters would, to one unacquainted with their volume and the favorable condition under which they exist, seem incredible. To state it as being equal to the force exerted by five hundred thousand horses would be to keep well within bounds. Already nearly two hundred quartz mills, over fifty flour, and one hundred and fifty saw mills, are driven by such inconsiderable portions thereof as have been diverted for this purpose. If all the water power existing in the New England States were added to that of New York, New Jersey, and Delaware, it would scarcely exceed that still running to waste down the side of the Sierra.

The generally open character of the country, the deep alluvial soil and its freedom from stones, and the facility with which lumber can be obtained for fluming, render the construction of ditches a matter of comparative ease throughout this region. Already a costly and wide extended system of aqueducts is to be found in the mining canals that ramify nearly all parts of it, supplying water to many of the quartz mills, as well as to hydraulic, sluice, and other modes of earth washing. This water, after having been used for the latter purposes, could, in many cases, be made subservient to the propulsion of machinery; and it will doubtless happen hereafter that as the auriferous earth becomes exhausted in different localities, the water once used for washing will be afterwards availed of for milling and manufacturing purposes.

Locating manufactories, foundries, and machine shops in this well watered district, will be but to bring them to the door of the consumer; since, in the mining communities to be planted here in the future will be found the best customers of these industrial institutions, which will thus be saved the expense attendant on the carriage of their wares to distant markets. These streams run directly across the principal mineral belt of the State; a country rich in every species of agricultural, as well as mineral and other kinds of natural wealth—wherefore, it is obvious, that all these several interests must be blended, growing up in harmony, mutually depending upon and aiding each other.

In case it should be found expedient, however, to locate these establishments further down where the fall is insufficient to create a water power, then the magnificent forests on the mountains above will afford an unfailing fuel supply—the construction of short railroads, only, being necessary to insure the delivery of lumber and firewood at the points where needed in endless quantities, and at very low prices. It is, furthermore, worthy of remark in this connection, that many kinds of stone suitable for the foundation works, and where required for the superstructure also of buildings, abound in almost every part of this region, and generally under very favorable circumstances for quarrying and removal. While in the coast and other mountain ranges of the State the water power, as well as the wood and lumber supply, is much more restricted than in the region just considered, there is still a sufficiency of both in many places to enable the business of manufacturing to be carried on to a considerable extent, some of these streams having already been appropriated for driving machinery.

In the larger towns, more especially in San Francisco and its suburbs, destined, from the advantages of its position, to become a point at which more manufacturing will probably be concentrated than at any other on the coast, coal can be obtained at rates that will render the cheap generation of driving power, through the agency of steam, always practicable. Or what is still more probable, petroleum, now promising to be brought into use so successfully as a steam fuel, will come to be extensively introduced in these localities. Should the result anticipated from the experiments now being made with this fuel be ultimately realized, the coast region of California will be rendered quite independent of other sources of fuel supply—the deposits of this substance being widely diffused, easily obtained, and wholly inexhaustible. In addition to this immense power already created, and so convenient to hand, or that can be so cheaply generated, California enjoys in her genial and salubrious climate another great advantage over most manufacturing countries. In that part of the State where these multifarious industries are likely to grow up, it can almost be said that there is no winter. The heat of the summer in the interior is long continued, and in many localities for a time oppressive, though never debilitating, owing to the cool nights that prevail throughout that season. During the remainder of the year the weather there is for the most part delightful, out door laborers seldom suffering from either heat or cold. In California the mill-wheel is rarely ever pinioned by frost, or the paths that lead to the workshops and factories obstructed by snow and ice. Neither is the craftsman ever forced to go shivering to his task, or to labor in a chilled and freezing atmosphere—the benignant climate invigorating the system and relieving toil of its greatest hardships. Here the shops, and factories do not require to be kept constantly closed to economise the heat within, compelling the operative to labor in a foul, fœted and debilitating atmosphere, destructive to health and depressing to the spirits. Except in the more elevated districts, the temperature is such that even in winter all active employments may be comfortably pursued in the outer air or with open doors. In this mildness of the climate the artisan classes will ever find a safeguard against sickness and discomfort, while it reduces materially the cost of living, in the saving of fuel, clothing and shelter. The quantity of fuel required for a small family does not amount to more than half as much in California, take the year through, as is necessary anywhere throughout the Northern and Middle States of the Union ; while the cost of clothing, notwithstanding somewhat higher prices, is considerably less than in the Eastern States ; the difference in the expense of constructing dwellings being still greater in favor of California. It is estimated by competent judges that at least twenty per cent. more service is rendered the employer here than in most other countries, in consequence of the greater mildness and salubrity of the climate. Food, including an abundance of the most delicious fruits, must always be cheap in this State, while in most country localities the employés of the workshops and factories can, if so inclined, each be the owner of a house and lot, the latter of sufficient size to enable him to raise his own fruits and vegetables. Land is everywhere cheap, already cleared for the plough, and generally of good quality, while firewood and lumber must remain at very moderate prices for many years to come, in the districts designated by nature as the great manufacturing field of California—especially along that portion of it that covers the western slope and the foothills of the Sierra Nevada. In the heavy expense that must always attend the transportation hither of manufactured commodities, particularly the more low priced and bulky, from countries of cheaper production, the California maker of these articles will enjoy a perpetual tariff, which alone will go far towards protecting him against the superior skill, and cheaper labor and capital, not only of the Eastern domestic, but also of the foreign manufacturer, to say nothing of the duties imposed by the general Government upon the imported wares of the latter. Again, nearly all the staples that constitute the raw materials required for manufacturing, are found existing native in California, or can be raised here with the utmost facility, the soil and climate being well adapted to the growth of a wide range of such productions as are most needed for this purpose. For anything requiring to be made of wood, metal, wool, leather, or of any of the more common fibres, except cotton, California has, or can produce the material, generally of the primest quality, and at scarcely greater cost than the most favored countries on the globe. Of the substances most essential in making chemicals, paper, powder, glass, cordage, stone and earthenware, we have an abundance. The country is prolific in nearly everything most required for the operations of the forge, the foundry, the ship-yard, the rope-walk, the carriage, machine, and furniture shops; while the animal, vegetable, and mineral oils, the resins, salts, pigments, etc., are of easy obtainment. We are near to the best fisheries and fur producing regions of the world; have marbles, cements, and fine earths, rare woods, the precious and the useful metals and minerals, with plants, barks and roots of every class and variety.

Some ten or twelve years ago, when the partial exhaustion of the more superficial placer mines caused an almost universal depreciation in the prices of property and a general stagnation of business, and labor seemed so superabundant in California as to excite just apprehensions as to its future profitable employment, a number of enterprising and adventurous citizens, in the hope of supplying with home-made articles a few of the numerous commodities imported from abroad, embarked in manufacturing, mostly with limited means and in a small way, and thus laid the foundation for those various industries which, having since obtained a permanent footing and become widely extended, have saved California from that partial depopulation and business prostration that was so justly apprehended; and which, but for the timely inauguration of these industrial enterprises, would no doubt have overtaken her. To the introduction of this wise policy is the State, and more especially the city of San Francisco, indebted for the marked prosperity enjoyed by them during the past eight or ten years; and in the absence of which it would be difficult to say what might now have been the condition of our domestic industries, or the financial status of the State. Millions of dollars have been retained in the country, being used in the payment of wages to our own citizens, and in the erection of works and the purchase of articles of home production that otherwise would have been sent abroad, to be spent in the purchase of these commodities as before. By the introduction on our own soil of these factories a demand has been created for a long catalogue of articles and products that otherwise would have lacked a market.

The value of the various articles manufactured in San Francisco, during the year 1866, is estimated at over $20,000,000; the aggregate product of the whole State having been about $30,000,000. By virtue of her position, California will be able to supply such manufactured goods as Western Mexico, Central America, China, Japan, and the islands of the North Pacific may require, or be able to take of strangers, paying for the same in cash, or in such native production as they may have to offer in exchange. In thus supplying these peoples she will find a vast outlet for the products of her shops and factories, and secure a trade that cannot fail to prove profitable, since it can hardly admit of a competitor. With such manifest advantages then growing out of her position, and the great natural facilities she enjoys for engaging largely and successfully in the business of manufacturing, it becomes evident that California is destined to enter early upon an extensive career in this department of industry. Nowhere in the world are the conditions for building up readily a vast and diversified interest of this kind so favorable as upon the coast of the North Pacific—the extent to which our people have already embarked in many branches of the business, evincing a just appreciation of these advantages, and a purpose to turn them to practical account as rapidly as circumstances will warrant. In some respects it must be admitted that California is placed to disadvantage as a manufacturing country, though these obstacles and drawbacks are limited in their influences, and will probably prove temporary in duration. Credits here are short, and interest is high, forcing the manufacturer to pay dearly for his capital, and often compelling him to press his wares upon the market in advance of consumptive requirement. Owing to the narrow extent of back country to be supplied, and the limited outlets available in other directions, care is required that manufacturing is not pushed to excess, it being necessary also, while preventing prices falling below the cost of production, that they be so restricted as not to encourage over importation.

For a time, too, the California proprietor found it difficult to command the highest order of skilled labor; its remoteness, the limited extent, uncertainty, and newness of its manufacturing industries deterring the best class of artisans from leaving profitable and generally permanent situations, to seek employment in such a distant and precarious field. With the establishment and growth of these pursuits in California, however, the best workmen of the Atlantic States and Europe have found their way hither in such numbers that it is probable there are now here as many of this class, in proportion to the whole number of operatives, as in any other country; the high wages offered bringing to our shores frequently the choicest artisans to be found in the most famous establishments of the Old World.

What progress has been made in founding and building up manufacturing industries in California will, in part, appear from the following brief descriptions of the leading establishments in this line of business, only a few of the more prominent facts connected with the same being here presented.

## WOOLEN MILLS.

In the making of woolen fabrics we have one of the earliest founded, and now most extensive and prosperous branches of manufacturing yet established in the State—the steady supply, cheapness and excellence of the wool grown here giving great encouragement to this line of business. The fabrics turned out by our woolen mills are not excelled by those of any other country. Up to 1859 the entire wool clip of California was shipped abroad for a market. That year, the Pioneer Mills starting, used a small portion of it—quite a large quantity being now consumed by the several establishments running in the State. At the present time there are in California five of these factories, four of which are running; the fifth, located on the Merced river, though completed and ready for work, not yet being in operation; it is, however, to be started during the spring or early in the summer of 1868. The erection of others are contemplated in different parts of the State, and there will no doubt be several additions made to the present number in the course of a year or two, at furthest. Preliminary steps towards the building of a woolen mill at Santa Cruz, and another at Folsom, have already been taken, and will no doubt result in their early construction.

### THE PIONEER WOOLEN MILLS.

The first works of the kind ever put up in the State were the Pioneer Woolen Mills, erected in 1858, at Black Point, in the northwestern part of the City of San Francisco. Though built in 1858, they did not commence work till the following year. The first edifices put up by this company, though spacious and convenient, being of wood, were unfortunately burned up in the fall of 1861. Notwithstanding the loss of the proprietors, Messrs. Heyneman, Pick & Co., was heavy, the buildings being filled with new and costly machinery, selected with great care, and imported from the East, they at once set about rebuilding the edifice, which was made more spacious than that destroyed, being at the same time, for greater safety, constructed wholly of brick. This mill is now owned by a company having a capital of $450,000. The machinery consists of eighteen sets of cards, six thousand spindles, seventy-two looms, eight mules and fourteen jacks—the whole put in motion by a steam engine of one hundred and fifty horse power. Three hundred and fifty men, a portion of them Chinese, are employed in the various departments. The product of these mills for the year 1866 was 30,000 pairs of blankets, 60,000 yards of broadcloth, tweed and cassimeres, and 375,000 yards of flannel; consuming 1,500,000 pounds of fine wool.

In 1867, there were manufactured 40,000 pairs of blankets, 100,000 yards of broadcloth, tweeds and cassimeres, and 300,000 yards of flannels—1,600,000 pounds of wool having been consumed. Their annual capacity is equal to the consumption of 3,000,000 pounds of wool. Large quantities of flannels are made up into shirts—sixty hands, operating with sewing machines, being employed at this business.

### THE MISSION WOOLEN MILLS.

These mills are also located in the City of San Francisco, being on the corner of Sixteenth and Folsom streets. They are very extensive, the buildings pertaining to the establishment occupying, and in good part covering, an area of ten acres. These works, erected in 1861, have the greatest capacity of any institution of the kind in the State—material additions having been made to them recently. Besides the articles designated as being made at the Pioneer mills, they here manufacture cloakings and traveling shawls. This company have a capital stock of $500,000, and employ four hundred and fifty hands constantly. The mill is driven by a steam engine of one hundred and fifty horse power, and consumes 2,200,000 pounds of wool annually. In 1866 there were manufactured at this establishment 80,000 pairs of heavy army and navy blankets, 125,000 yards of broadcloth, tweed and cassimere, and 500,000 yards of flannel, besides large numbers of shawls, quantities of cloakings, etc.—the gross value of the products of these mills amounting to nearly $1,000,000 per annum. The wages paid employés for 1867 amounted to $135,000. For that year the proprietors report no increase of business. For the year ending April 30th, 1867, the value of manufactured goods made by the Pioneer and Mission Woolen Mills, as returned to the Internal Revenue Department, reached the sum of $816,815. In these returns are not included materials made into garments, and given in under the head of clothing. To the blankets and flannels made here was awarded the premium medal, at the Paris Exposition, in 1867, over all competitors from the United States.

### THE PACIFIC WOOLEN MILLS.

The Pacific Woolen Mills, located on Folsom street, between Eighteenth and Nineteenth, San Francisco, spin only yarns, and manufacture knit goods from the same—this being the only extensive establishment of the kind on the coast. The main building is 112 by 52 feet, three and a half stories high, with numerous outhouses and dwellings for operatives attached. These works were originated by Mr. James Roberts, the capital stock employed $400,000. The works are driven by a steam engine of one hundred horse power; consume annually 500,000 pounds of wool, all of choice quality, besides 100,000 pounds of cotton —value of goods made, $400,000 per annum; they are now being enlarged to a producing capacity of $2,000,000. They employ 24 women, 24 white men, and 42 Chinese, besides from 250 to 300 women and girls seaming the goods at their houses, who now turn out daily 60 dozen shirts and drawers, and 150 dozen of hosiery. Only medium and lower grade goods have thus far been produced, the mills running on short time. With the additions now being made, it is intended to manufacture goods of the highest and finest grade in this line, and to operate the works night and day. The demand for wares of this kind is rapidly increasing, and it is questionable if the establishment, even when enlarged, will be able to fully meet the rapidly growing requirements of the coast.

There was another knitting mill, constructed on a much smaller scale, situated in the southwestern part of the city. It started work in August, 1866, and made nearly every variety of goods, but was burned down the next year. This mill, in addition to the usual carding and spinning apparatus, was supplied with a number of Aitkin's patent knitting machines, and produced articles of unsurpassed excellence.

### THE MARYSVILLE WOOLEN MILLS.

These mills, situated in the city of Marysville, Yuba county, commenced operations in September, 1867. They are of limited capacity, containing but seven looms, with corresponding apparatus, and make only blankets and flannels. They are the property of a company incorporated with a capital of $50,000.

The establishment of even the above limited number of woolen mills, has already had a highly beneficial effect upon a variety of interests in this State, besides giving profitable employment to a large number of operatives and outside laborers, and tending to reduce the prices of the commodities made to the California consumer; it has also, by creating a demand for our home grown wools, protected the sheep raisers of the State against the monopoly of buyers purchasing here for foreign markets, and who, by combining to keep down prices, often depress them below a paying standard. Since the founding of our local mills, the prices of wool have not only remained more steady, but have materially advanced. Of the 8,600,000 pounds marketed in San Francisco city during the year 1866, our home mills purchased 3,200,000 pounds, showing a large and healthful competition, although there were at that time but two mills in operation. Of the 10,500,000 pounds disposed of in 1867, our local establishments took 3,000,000—a ratio of increase that it may reasonably be expected will hereafter be every year enlarged.

## COTTON MANUFACTURES.

The only works in this line on the coast are the mills of the Oakland Cotton Manufacturing Company, situate near Oakland, Alameda county. This company was organized in August, 1865, with a capital stock of $100,000, and soon after put up a two-story brick building, 90 by 45 feet, with three large brick houses contiguous, for the use of overseers and workmen. The mill, driven by a forty-horse power steam engine, employs about thirty hands, and up to January, 1868, had been confined to making shirtings, sheetings, osnaburgs and drills, with a species of wool and cotton tweeds. At that time the capital of the company was increased to $200,000, with a view to procuring machinery suitable for the manufacturing of grain bags, which, it is believed, can be made at a profit under the thirty per cent. *ad valorem* duty imposed on the foreign article. The importance of making our own bagging will be the more readily appreciated when it is known that over $1,200,000 are spent annually in the purchase of sacking for the yearly grain crop of the State—being about seven per cent. of its entire value. At present it will be necessary to import most of the raw material for this branch of operations; but there is reason to believe that in a short time this can be supplied, at least in good part, by textiles of home growth. Flax is now raised here for the seed alone, but with a market for the lint, the latter could, and no doubt would, be furnished in any required quantity; and though, perhaps, not of the best quality, yet sufficiently good for this purpose. So, also, hemp would be grown if this fibre were in large and steady demand at fair prices. Thus it will be perceived how large a variety of economical ends would be subserved by the making at home of the sacking required for our annual grain crop. First, the heavy money drain requisite for the purchase of these articles abroad would be stopped, a large additional number of operatives would be given employment, and the now neglected business of flax and hemp growing, would be likely to receive an impulse that would render it both permanent and profitable.

The Oakland Cotton Mills have heretofore run thirty-two looms. In 1866 they consumed 100,000 pounds of cotton, and in 1867, 125,000 pounds—about 30,000 yards of shirting having been made monthly. The total product for the year 1866 was 100,000 yards of shirting, and 50,000 yards of brown sheeting—the latter mostly for the Mexican market, besides large quantities of 4-4 cotton cloth for flour sacks. The raw material for this establishment is obtained mostly from the Atlantic States, a little also having been procured from Mexico and other foreign countries. The amount of cotton produced in California thus far has been limited to a few bales of inferior quality, no special efforts having been made to grow it under the low prices lately ruling.

There is but a single establishment for making cotton-wadding in this country, that of J. C. Mayer & Sons, situated on Turk street, San Francisco. At this factory every description of wadding and batting is made, the capacity of the works being 2,000 pounds daily, though only about 10,000 pounds were worked up in 1866, and 15,000 in 1867. The cotton used is mostly obtained from Mexico and the Society Islands.

Some time since a movement was made by certain parties in San Francisco towards organizing a company to put up a carpet factory in that city; and, although the project remains in abeyance, there is not much doubt but that it will be carried to early consummation, as more than a million dollars worth of these fabrics are imported into the State every year.

## FLOURING MILLS.

The annual wheat crop of California, during the past three years, is estimated as follows, viz: At 11,579,127 bushels for 1865; at 14,000,000 bushels for 1866, and at 15,000,000 bushels for 1867—the prospect being that the yield for 1868 will considerably exceed that of any of the three preceding years. For several years prior to 1865 large quantities of breadstuffs were imported into the State; and eighteen years ago scarcely any wheat was raised in California, but comparatively little having been grown for a number of years thereafter. The flour exported from the State in 1866 amounted to 324,353 barrels, valued at $1,870,000, and in 1867 the number of barrels exported amounted to 520,000, valued at $3,200,000, while it is thought the wheat crop of 1868 will be much greater than that of 1867, and that our exports of flour will be correspondingly increased should there be a foreign demand for it. The extreme dryness of the weather during the season for the maturing and gathering of the cereal crops, renders California wheat the hardest and dryest, as it is also generally the plumpest and brightest grain in the world, the flour made from it being distinguished for almost every excellence.

There were in March, 1868, one hundred and fifty-seven flouring mills in the State, ninety of which are driven by water and sixty-seven by steam. They carry a total of three hundred and forty-six run of stone, and cost, in the aggregate, about $3,000,000. They have a capacity to make 15,000 barrels of flour daily, or 3,500,000 barrels yearly, running full time.

Of these mills, eleven are situated in San Francisco, each of the larger grain growing counties also containing a number, generally proportioned to their facilities for shipping flour to the San Francisco market, or the demands of the local trade. Several new mills have been erected in different parts of the State during the past year, the largest of these being at Folsom, Lincoln, and Benicia. Sacramento city contains three mills, having a joint capacity to make 1,150 barrels of flour daily, and as they run a good portion of the time, their annual product is large. Stockton has two mills capable of grinding 740 barrels of flour daily, the quantity turned out annually at these establishments also being considerable.

Of the San Francisco mills, the Golden Gate, the largest in the city, made in 1866, 90,000 barrels of flour, and in 1867, 100,000 barrels, 90,000 of which were extra, and about 10,000 of lower grades. The National Mill ground during the year 1867, 39,182 barrels of superfine flour, 56,557 barrels being extra, and 1,805 of Graham flour, making a total of 97,544 barrels for the year. The Golden Age Mill turned out during the year 1867, 66,548 barrels of flour, all extra superfine. The Genesee Mill produced the same year 50,000 barrels, seventy-five per cent. of which was extra, balance superfine. The Commercial Mill made 38,000 barrels of flour in 1866, and 40,000 in 1867. The Capital Mill ground in 1867 what was equivalent to about 35,000 barrels of flour; the principal articles made consisting of Indian meal, groats, hominy, and feed stuffs. The other mills in the city, all of inferior capacity, ground during the same period some fifteen or twenty thousand barrels of flour; the total product of all the San Francisco mills, for 1867, being estimated at a little over 400,000 barrels, worth on an average $6 60 per barrel.

## SUGAR REFINERIES.

Although both the soil and climate in many parts of California are suited to the successful culture of the sugar cane, no efforts at raising it on an extended scale have yet been made, the great cost of labor forbidding large production where raw sugars can be obtained at such low rates from adjacent countries. In some parts of the State, quite a quantity of syrup and molasses is annually made from the sorghum, or Chinese sugar cane, but as they are of inferior quality, its production is not likely to increase, except, perhaps, at a few points in the more remote interior, where it will be expensive to procure the refined article. The cultivation of the sugar beet promises to be extensively introduced here, measures having been devised looking to a large planting, and the erection of suitable machinery for its manufacture. The bulk of the raw sugars for the use of the three refineries operating in this State, all being located in San Francisco, are imported from the Hawaiian Islands, Central America, Manila, Batavia, and Peru.

The Refinery of the San Francisco and Pacific Sugar Company, the earliest founded of these establishments, was incorporated in 1855, with a capital of $800,000. The buildings are of brick, very substantial, and cover a large area. The motive power of these works consists of a two hundred horse power engine. They are capable of refining 24,000 barrels of sugar annually, and employ about one hundred and sixty hands. The monthly yield averages 7,000 barrels of white sugar, 4,000 barrels of crushed, and 50,000 gallons of syrup. The product of this refinery, for 1866, amounted to $2,008,213; in 1867, 16,000,000 pounds of raw sugar were worked up.

The California Sugar Refinery, also an extensive establishment, incorporated in 1867, situated in the southern part of the city, near the works of the company last described, has a capacity for using about one hundred barrels of sugar daily, or 12,000,000 pounds annually. Here a one hundred horse power engine is employed to drive the works, about sixty hands being engaged on the premises. By the introduction of certain improvements here introduced, it is claimed that the making of crushed or kiln-dried sugar is much cheapened and facilitated.

The Bay Sugar Refinery, located in the northern part of the city, has a capacity for making about 50,000 pounds of sugar daily.

Though the consumption of sugar on this coast is enormous compared with the population, these several establishments have a joint capacity to refine more than double the amount required for home use; wherefore, with a view to adapting the production to the amount actually required, they run full time but a portion of the year. The motive power used in these refineries amounts in the aggregate to two hundred and thirty-five horse power, the working force employed by them when in full operation being about two hundred and eighty men. In 1866 they worked up 22,743,312 pounds of raw sugars, which netted 18,203,100 pounds of the refined article, 570,031 gallons of syrup having been made besides. The total amount of raw material refined in 1867 was 16,262,861 pounds, the value of the manufactured article being $2,895,249 in currency. During the same year 415,685 gallons of syrup were made, as returned to the Internal Revenue Office, though these returns failed to indicate the entire production of that year, syrups having been for a portion of the time exempted. The imports of sugar into the State, during the years 1865–6–7, were respectively as follows: For the first, 29,091,952 pounds, 6,528 barrels, and 24 boxes; for the second, 39,767,924 pounds, 8,821 barrels, and 31 boxes; and the third year mentioned, 35,009,603 pounds, 889 barrels, and 49 boxes—that indicated in pounds being foreign, while that coming in barrels and boxes was of Eastern importation. Our exports for the same period were for 1865, 276,500 pounds, 5 hogsheads, 2,529 barrels, and 4,758 boxes; for 1866, 480,500 pounds, 10 hogsheads, 3,360 barrels, and 2,562 boxes; and for 1867, 155,437 pounds, 280 hogsheads, 866 barrels, and 2,449 boxes—the quantities expressed in pounds being sent to foreign, and the balance to domestic ports.

## IRON WORKS.

Notwithstanding the consumption of iron has always been large in this State and the raw material expensive, no smelting works or forges have yet been erected to extract the metal from the ore, or for its further preparation for the uses of the foundry and other branches of the mechanic arts. Yet, as large deposits of the ores of this metal of excellent quality, and favorably situated for working, exist in many parts of the State, it is reasonable to suppose that works for smelting the ores and forging the pig metal into blooms will soon be erected. With the inception of quartz milling in California came also a greater consumption of iron, which, keeping pace with the rapid increase of that and similar industries, has at length grown into enormous proportions. The use of cast iron pipes for conducting water through the mines, the extensive gas and water works in many of our towns, and the employment of this material extensively in building, not only for ornamental purposes, but also in making it a part of the superstructure itself, while it indicates a large present consumption, but faintly foreshadows that which must inevitably attend the rapid development of our natural resources that may now certainly be counted upon. Railroad construction alone must soon force the manufacture of this article into existence on a large scale, since it can beyond question be made in many of the remote localities of the interior for much less than the cost of transportation from Eastern marts would alone amount to.

Heretofore, all demands for this material have been met by direct importations, or the vast quantities of old iron obtained from discarded and worn out machinery, the breaking up of condemned vessels and similar sources, the amount thus placed at disposal being large. Still, as stated, the requirements on this side the continent must soon attain such proportions as will induce the construction of smelting works not only in California, but also in other of the Pacific States and Territories—a project elsewhere described in this work having already been set on foot for the erection of an establishment of this kind on a large scale.

At the present time, there is no other single branch of manufacturing in California in which even one half as much labor and capital is employed as in the several departments of iron working, there being about forty of these establishments in different parts of this State. Fifteen of this number are located in San Francisco, while nearly every considerable town in the interior has one or more. Several of those in San Francisco, as well as the works at Vallejo, Benicia and Sacramento, are large and complete; while those at Stockton, Marysville and Nevada are of very respectable dimensions.

The value of the castings turned out at the several works in San Francisco, during the year 1867, amounted to over $2,000,000; the total number of hands employed being nearly 1,200. Besides supplying nearly all the machinery required for the quartz mills and reduction works of this coast, the shops and foundries of California manufacture much mining machinery for Western Mexico, and also sugar mills, pans, etc., both for that country and the Sandwich Islands.

The following remarks and statistics relative to the leading iron works in San Francisco will convey a general idea of their capacities, and the amount of work actually performed thereat in the course of each year :

### PACIFIC ROLLING MILLS.

This immense establishment, located at Potrero Point, in the southern part of the city, commenced in August, 1866, and just now approaching completion, is the only one of the kind west of the Rocky Mountains. These works, projected on a liberal plan, are designed to be first class in all their means and appointments, and as the company, starting with a capital stock of $2,000,000, possess all the skill, practical tact and energy, as well as the capital requisite to success, it is believed they will be able to compete successfully with both the Eastern and foreign manufacturer. The site of these mills has been well chosen, being in what must shortly become one of the great manufacturing quarters of the city. Convenient to deep water, vessels of the heaviest tonnage are able to load and discharge at the company's wharf in close proximity to their works. The building for the rolling gear covers an area of 150 by 235 feet, the machine shop attached being 80 by 100 feet, with numerous other smaller structures, the whole being built in a massive and substantial manner, and arranged with special reference to convenience and expediting operations. These buildings are now completed, a portion of them having already received their machinery, which is now in operation. In the rolling mill, one of the trip hammers, with forge, engine, cranes, and other appendages, is set up and at work, there being three other of these ponderous implements still to be put in place. The machinery for the works is on the ground, and is being adjusted with such rapidity that the whole will be ready for operations early in the summer of 1868. Already a number of large shafts and other pieces of heavy machinery have been forged, the hum of a mighty industry beginning to pervade the whole establishment. At these works, shafts for the largest ocean going steamers can be made—a feat not heretofore practicable on this coast. All the apparatus and appliances are here, of the most perfect and powerful kind, the imported portions having been constructed to order or selected with the utmost care, at the best establishments abroad. The massive steam engine, built at the Pacific Foundry, in San Francisco, is a model of strength and superior workmanship.

At these mills it is intended to manufacture everything usually made at similar establishments elsewhere, such as railroad and bar iron, rods, plates, and sheet iron of all sizes and patterns, together with every variety of sheet and rod copper, and also of brass. The company, in addition to their usual line of business, will engage in forging Lloyd's patent anchor, a California invention of ingenious construction and great practical value. They will also manufacture plates for iron ships—the policy of providing a yard on their premises for the construction of this class of vessels being now under advisement.

Over a thousand tons of old iron were, in March, 1868, lying on the company's wharf, having been collected in anticipation of early requirements, and it may fairly be presumed that now this material, instead of being regarded as a nuisance and shipped away, as heretofore, with little profit, will be carefully gathered up and retained in the country, having, through this new created home market, been converted into an article of prime necessity. The existence of these mills will also, it may be supposed, encourage an early effort being made to work some of the beds of iron ore in the State, with a view of supplying the demand for this metal, which must hereafter be constant and large. In its effects upon this interest, as well as upon numerous other domestic pursuits, the founding of this establishment will be likely to exert such a benign influence that it may be regarded almost in the light of a public benefaction. The powerful works of the Pacific Forge Company, operating near the Mission Dolores, are to be transferred to this establishment, to be used in the forging department.

### UNION IRON WORKS.

These works, started in 1849, by the Messrs. Donahue Brothers, with but few conveniences, and on a very contracted scale, now rank among the largest and most efficient establishments on the coast. As there were at that early period neither the material nor the facilities for extended operations in this line of business, so also there was then but a limited demand for the same ; what little iron work was required being mostly imported from abroad. At the start, the foundry blast was produced by a blacksmith's bellows ; the supply of material was scanty, and the shop tools few and imperfect. These works, so feeble in their beginnings, keeping pace, however, with the advance of improvements, have since undergone enlargement at various times, being now of immense capacity and extent. The number of hands employed averages about three hundred.

The main building, composed of brick, three stories high, has a frontage of 187½ feet, with a depth of 120 feet ; the area of the premises covering nearly 50,000 square feet. In the machine shop there are twenty-five lathes, eight planers—one of them the largest in the State—together with much powerful drill, cutting, gearing, and shaping machinery. In the smithery there is a fifteen ton steam hammer for forging purposes. The boiler department is supplied with a self-feeding punching machine, and also one for performing the operation of riveting. A laboratory and an amalgamation room provided for the use of miners desiring to test their ores, free of charge, forms a feature of these works.

The first piece of casting ever made in California was run here, and here also the first reverberatory furnace, for forging large shafts, was constructed. This foundry has, during the past few years, turned out considerable quantities of rolling stock for railroads, as well as many marine and locomotive engines, and other heavy pieces of machinery—the facilities for manufacturing heavy work being great.

### MINERS' FOUNDRY.

This foundry, with machine shops and boiler works attached, all on a large scale, employs about one hundred and fifty men. The works, driven by a sixty horse power steam engine, are among the most complete and capacious in the State. They are amply supplied with everything requisite for constructing the most massive and complicated kinds of machinery, the Miners' Foundry enjoying a high reputation for this particular class of work. For several years past the annual consumption of pig iron at this establishment has been about 1,800 tons, together with 300 tons of wrought iron, and 700 tons of coal.

### VULCAN IRON WORKS.

These works give employment to an average number of about one hundred and twenty-five men and boys. In 1867 they used 1,200 tons of pig iron, 200 tons of bar and round, together with 100 tons of boiler iron, and 25,000 pounds of rivets.

### PACIFIC IRON WORKS.

The Pacific Iron Works were erected in 1850, embracing besides a foundry, machine, forging, smithing and pattern department, also a boiler and wood work shop, giving more than usual variety to the operations carried on in this class of establishments. Another feature of these works consists of a branch devoted to the making of machine tools and apparatus, such as engine lathes, iron planers, drills, shears, etc.—implements heretofore mostly imported, always at heavy cost, and loss through delay, breakage, etc. Many of the tools, as well as machinery in use at this establishment, some of them complicated and costly, were made by the proprietors themselves. These works, which are very capacious, covering in great part four fifty-vara lots, employ a force of one hundred and twenty-five hands. In 1866 they consumed six hundred tons of pig, and three hundred and fifty tons of bar and plate iron, with seven hundred tons of coal, resulting in productions valued at $275,000. In 1867 the consumption was seven hundred tons of pig iron, three hundred and fifty of bar and plate, and eight hundred tons of coal; value of products, $300,000.

Though Messrs. Rankin, Brayton & Austin are now the proprietors of these works, the business continues to be conducted under the name of the original firm, "Goddard & Co."

### GOLDEN STATE IRON WORKS.

These works, with foundry connected, use a twenty-five horse power steam engine, and employ on an average about fifty men; consumed in 1866, seven hundred tons of pig iron; in 1867 consumed nine hundred tons of pig iron, and six hundred of coal.

### FULTON IRON WORKS.

The Fulton Iron Works, with foundry and machine shop attached, employ sixty-five men; consumed in 1866, four hundred and fifteen tons of pig iron, and in 1867, five hundred and fifty tons, together with three hundred and fifty tons of coal.

### PHŒNIX IRON WORKS.

At this establishment are made all kinds of iron doors, blinds, safes, vaults, shutters, etc.; employ twenty men, and worked up in 1866 two hundred tons of iron; in 1867, two hundred and fifty tons; annual value of work done being about $50,000.

### ÆTNA IRON WORKS.

These works are driven by a twenty horse power steam engine and employ thirty-two men. Consumption of iron in 1867, five hundred tons pig and fifty tons wrought; make the casting of stoves and ornamental iron work a specialty.

### ATLAS WORKS.

The Atlas Works, confined chiefly to making iron castings of every description for buildings, keep thirty men steadily employed, and have a capacity to melt six tons of iron at a casting; works driven by a powerful steam engine, and the establishment, which covers a frontage of 47½ by a depth of 175 feet, is supplied with everything requisite in the way of models and patterns for conducting a large and diversified business. The iron work, both ornamental and substantial, used upon many of the largest buildings in San Francisco, was cast at this establishment.

### THE JACKSON FOUNDRY.

This foundry is one of the largest of its class in the city, and is engaged in the manufacture of stoves, ranges, tinware, etc., supplying these articles to wholesale dealers. The bodies of these stoves are mostly imported, only the fronts and secondary parts, with the furniture, being made here. Grates, garden and school furniture, lamp posts and similar articles, are also made in large quantities, being always kept in ample supply to meet the wants of the trade.

### EMPIRE FOUNDRY.

The Empire Foundry makes castings for ornamental and other light work, such as leaves, pillars, caps, agricultural implements, gas fixtures, school furniture, etc. The foundry, of moderate size and capacity, is supplied with a good steam engine, powerful cranes, etc.

### THE PIONEER IRON WORKS.

These works, the first in their particular department founded on the coast, manufacture iron doors, shutters, safe vaults, etc.; they employ thirteen men; consumed one hundred tons of iron in 1866, and one hundred and fifty tons in 1867.

Sims' Iron Works make the same description of wares as the Pioneer, besides wrought iron girders, beams, fencing, etc.; employ fourteen men, and consumed in 1867 about one hundred and fifty tons of iron.

McAfee, Spiers & Co.'s Boiler Works, recently erected, employ thirty men. During the six months, ending with January, 1868, they had worked up thirty-five tons of iron, the products of which were valued at $20,000.

### BOILER WORKS—SAW AND FILE FACTORY.

The leading boiler shop of San Francisco is that of Coffee & Risdon—confined exclusively to boiler making—employing thirty-five men, and executing over one-third of all the work done in the city.

The Portland Boiler works consumed about two hundred and fifty tons of boiler, plate, and sheet iron, in 1867, giving a product of $15,000.

Among the miscellaneous establishments of the city working chiefly in iron and other metallic substances, is the Pacific Saw Factory, started in 1866, and which has been of signal advantage to lumbermen and wood sawyers, by enabling them to have repairs made and their orders filled readily. At these works everything is manufactured from the largest circular and gang saw to the most delicate blade required by the scroll cutter or cabinet maker, and invariably of a quality equal to anything imported.

Adjoining these works are those of N. W. Spaulding, where patent saw-teeth are made, and kept ready to supply the place of those worn out or broken.

The Pacific File Factory, started in 1866, employs ten men, and produced, in 1867, wares to the value of $10,000. Besides files of every description, and of a quality equal to any known to the trade, sections for reapers and mowers are made here, also pronounced very superior, it being the purpose of the proprietors to soon supply the entire local demand for these articles.

Besides the establishments above briefly described, there are many smaller iron works in the city, apart from the smitheries and smaller machine shops, which, though not of sufficient importance to justify a detailed notice in this place, turn out a considerable amount of products yearly, giving employment to a large aggregate number of workmen.

## BRASS FOUNDRIES.

Of these works there is a large number in different parts of the State, the greater portion being located, however, in the city of San Francisco. In 1866 more than one half of the requirements of the coast were supplied by the products of these home foundries, which are able to fill satisfactorily nearly every variety of order in their line.

The aggregate quantity of brass worked up in the State, outside of San Francisco, is about 65,000 pounds annually; the quantity of copper used being valued at about $30,000. The largest amount of these metals is consumed at the works of the Pacific Mail Steamship Company, Benicia, and at the Navy Yard on Mare Island.

The principal brass foundry in San Francisco is that of W. T. Garratt, the pioneer establishment in the city. At this foundry the first bell ever made in California was cast, this branch of the business being still kept up. These works, which employ about thirty men, consumed forty tons of brass and copper in 1867—products valued at $60,000.

The Eagle Brass Foundry employs fifteen men; used up in 1867 twenty tons of brass and copper—yielding products valued at $20,000. At this foundry most of the Government ship work on this coast is executed.

The California Brass Foundry, largely engaged in making sheathing, nails, spikes, and similar wares for use in ship building, employs ten men, and consumed in 1866, 4,500 pounds of brass and copper; and in 1867, 6,000 pounds of these materials, turning out wares worth $25,000.

Dobrzensky's Brass Foundry gives steady employment to twenty hands; value of products in 1867, $30,000; copper and brass consumed valued at $12,000. Manufactures chiefly gas metres.

In addition to the foregoing there are several other brass foundries in the city, the entire number of men employed at these works being about one hundred and sixty. The total annual consumption of brass and copper reaches about 160 tons, giving an aggregate production valued at $260,000.

## SAW-MILLS AND LUMBER.

A little over twenty years ago there was not a saw-mill in California—what little lumber had previously been required having been whip-sawed, or, more generally, split or hewed out by hand, the whole of it being made from redwood, where that timber could be procured. There are now four hundred and twelve of these establishments in this State, two hundred and seventeen of the number being driven by steam, and one hundred and ninety-seven by water power. The aggregate original cost of these mills was about $2,700,000. They have a joint capacity to cut over 500,000,000 feet of lumber annually—the quantity actually cut during the year 1867 having amounted to about 200,000,000 feet. For a more detailed account of the extensive mills operating in the great lumber region along the northern coast, the chapters descriptive of Humboldt and Mendocino counties may be consulted—a list of the mills located in each county, with figures indicating their cost, power, capacity, etc., having been given in that part of the work treating of the several counties.

While nearly all the hardwood lumber used in the State is imported from the East, scarcely a city in the Union is supplied with the several varieties of pine, fir, spruce, cedar, and redwood, of better quality, or at comparatively cheaper rates, than the City of San Francisco—the great entrepot for the lumber trade of nearly the entire coast. Hither is shipped the immense product of the mills of Humboldt and Mendocino—Port Orford and Puget Sound lying to the north, while the redwoods of San Mateo and Santa Cruz counties, on the south, make free contributions from that direction. The lumber sent to San Francisco from these several sources during the year 1866, amounted, according to the books of the Lumber Dealers' Association, to 85,000,000 feet of pine, and 55,000,000 feet of redwood, besides 22,000,000 laths, and 25,000,000 shingles—considerable quantities of spruce and cedar, the latter coming mostly from Port Orford, and being considered the best material for flooring in use, having meantime been received, in addition to the above. The receipts of lumber at San Francisco for 1867 were larger than those of the preceding year, though less than the estimated receipts for 1868.

## WIRE AND ROPE WORKS.

The wire and rope works of A. S. Hallidie, the only establishment of the kind on the coast, are located in the city of San Francisco. They were erected in 1857, and though capable of doing but little at first, are now able to turn out over twelve hundred tons of rope and cable annually. The articles made here embrace every description of cordage, ropes of a single piece three thousand feet long, and weighing nearly forty thousand pounds, having been manufactured. This establishment has supplied most of the hoisting works of Nevada with the flat wire rope used on their reels, also the cables for nearly all the suspension bridges erected during the past ten years in California, Oregon, and British Columbia, some of these structures having over four hundred feet span. The wire used in these works is mostly drawn in the mill of the company, situated at North Beach.

About fifty tons of iron are woven into screens, sieves, cloth, etc., at the works of H. T. Graves, which give employment to fifteen men, and turn out about fifty thousand square feet of wire work annually, four looms being kept steadily running.

## PACIFIC CORDAGE FACTORY.

This, the only establishment of its class on the coast, was started by Messrs. Tubbs & Co., at the Potrero, in the southern part of San Francisco, in 1856, since which time it has been in operation with but little interruption, producing considerable quantities of rope, the most of it assorted Manila, and of large size. The rope-walk of this company is fifteen hundred feet long, the building comprising the spinning department being one hundred feet in length by forty in width. The machinery is driven by a steam engine of one hundred and fifty horse power, arrangements having been made for enlarging the works to double their present capacity, the increasing demand for large-sized mining rope having rendered this necessary. For several years past fifty persons have been engaged here, the annual consumption of stock having been about two million pounds, the most of it imported from Manila direct. Latterly, considerable New Bedford cordage has been brought from the Atlantic States, this stock having gradually obtained a preference over the Manila.

## TANNERIES.

Prior to the settlement of California by our people, and for several years after, the hides of the country were all shipped away, there not being a single tannery in the State. The quantities shipped hence were immense, these articles constituting the staple export while the country was under Spanish and Mexican rule. The first efforts at tanning, made about fourteen years ago, failed of complete success, owing mainly to the inferior quality of the bark used, the properties of the different kinds not being then well understood. In a few years, however, this difficulty was obviated, our tanners having learned to select such bark as was well suited to their purposes, of which there is fortunately an abundance in many parts of the State. There are now over forty tanneries in California, the total product of which is estimated at nearly $800,000 annually. The number of hides of various grades tanned in 1867 amounted to about 100,000; the kinds of leather manufactured consisting mostly of sole, kip, harness and belting, though some calf skin and morocco were also made—more attention being now paid to the finer varieties than formerly. Of all, except the finer kinds, enough leather is now made in the State not only to supply all local wants, but a large surplus for exportation—the shipments hence for 1867 having amounted to about 2,000 packages, valued at over $100,000. The leather of California tan commands the highest prices in all foreign markets, owing to the special good qualities imparted to it by the superior strength and excellence of the tannin used, and the great advantages secured to our manufacturers through the long rainless season, whereby they are enabled to carry their leather through all the necessary processes without interruption.

The peculiar species of oak that yields this superior tannic acid is found in the Coast Range, extending from near Monterey to a point a little north of the Bay of Mendocino. It also grows plentifully along the western flank of the Sierra Nevada; therefore, the most of the large tanneries in the State have been located at points where the bark of this tree can be obtained conveniently, it being liable to waste with frequent handlings, while its bulk renders it costly of transportation. The principal leather producing counties comprise Santa Cruz, San Francisco, Santa Clara, Sonoma, San Joaquin and Sacramento, though there are several others containing one or more tanneries.

Santa Cruz contains seven extensive works of this class, the whole consuming three hundred tons of bark monthly, and producing 50,000 sides of sole, upper, and harness leather per year, valued at $300,000. This county took the initiative in the tanning business in California, the abundance of fine water, both for the propulsion of machinery and other uses, the excellence of the climate, the proximity of the oak forests to the town, near where the most of these works are situated, and the facilities enjoyed for shipping away the manufactured article, all combining to render it one of the most eligible spots in the State for the prosecution of this business.

There are twelve tanneries in the suburbs of San Francisco, several of them being quite extensive; one of the largest, that of Messrs. Wolf & Co., being carried on in connection with a boot and shoe manufactory—the latter also an extensive and flourishing establishment.

## POWDER WORKS.

The consumption of gunpowder in this State has been immense since the business of vein mining was more extensively entered upon, and the plan of using it for breaking down the high banks of auriferous detritus has been so freely resorted to ; the inauguration of active railroad building having more recently created large and unusual demands for this article. The demand for the regions drawing their supplies mainly from California now considerably exceeds 200,000 kegs annually, a quantity that will be largely increased in the course of a few years, unless the use of this explosive shall meantime be superseded by other more cheap and powerful agents—a result by no means improbable.

There are but two mills in California engaged in the manufacture of gunpowder—that of the California Powder Works Company, Santa Cruz county, and that of the Pacific Powder Mill Company, at Olema, Marin county, the leading facts concerning both of which will be found embodied in the respective articles descriptive of these counties. Since coming upon the market, the powder made at these mills, owing to its superior strength and freshness, has been preferred to the best imported brands, their former capacity having been insufficient to fully meet the requirements made upon them. After a suspension of several months, for the purpose of enlarging the capacity of their works, and introducing important improvements, the California Company resumed operations at their mill in February, 1868, with a view to conducting them on a much larger scale than ever before. The two mills now running in the State, are capable, together, of producing over one thousand kegs of powder daily.

Since this home made article came into use, the prices, besides being reduced, have been preserved from those capricious fluctuations arising from an alternately depleted and over-stocked market, and with present facilities for manufacture, it is not probable that California or the adjacent States or Territories will, for any length of time, be dependent even in part upon these distant and uncertain sources of supply, except, perhaps, in the matter of the finer and higher-priced grades of powder. The advantages enjoyed here for making blasting powder are such as should hereafter guarantee a full supply of a good article, at rates not higher than those now prevailing—$2 50 per keg—if, indeed, it may not be expected that prices will gradually tend toward lower figures.

The willow and alder, for making suitable charcoal are found growing in the vicinity of the present works. Sulphur being plentiful in many parts of the State, can be obtained at low prices ; and, although no saltpeter has yet been found in California, the nitrate of soda, a good substitute in making blasting powder, and used also sometimes in the manufacture of the finer kinds, is procured from Peru at very moderate rates, it being abundant in that country.

## FUSE FACTORY.

This article, being extremely liable to be injuriously affected by the moisture to which it is exposed during long sea voyages, is necessarily more or less damaged when imported for use in California. To this circumstance many of the painful and fatal accidents of such frequent occurrence in the mines are due. With a view to improving the quality of this article, and at the same time reducing the price, works have been erected at two different points in the vicinity of San Francisco for its manufacture.

## PAPER MILLS.

Prior to 1855 every variety of paper entering into the consumption of this coast was imported; in that year the first mill having been erected in this State, the supply began to be met in part by paper of home production. There are now two paper mills in California ; one situated in Santa Cruz, and the other in Marin county.

California, aside from its superior climate, possesses some peculiar advantages for making paper of every description. The raw material exists here in such abundance as to render a supply always certain at moderate cost. The waters of our mountain streams, besides being ample to serve for propulsive power, are of that soft and limpid character so essential to the production of first class paper. Very rarely in other countries do streams possess that degree of purity so necessary for cleaning purposes.

While our home mills are turning out nearly enough of the coarser kinds of paper to meet all demands, we are still largely dependent on importations for finer varieties. Were our own mills worked up to their full capacity they could make sufficient of every kind to supply the domestic consumption, but this is not done owing to the prices, particularly of writing and fancy paper, being kept at extremely low figures through excessive importation. The joint product of the two mills in this State amounts to about $260,000 annually. The raw stock worked up by them consists of 500 tons of rags, 300 of old rope and 1,000 of straw, together with 450 barrels of lime and 4,000 pounds of sulphuric and muriatic acids annually.

### GLASS WORKS.

The demand for bottles, vials, and the coarser kinds of glass ware, was for many years limited in California. With the growth of the wine interest, however, the manufacture of chemicals and patent medicines, the bottling of mineral waters and the rapid increase in the business of preserving fruits, meats and vegetables, the demand for vessels suitable for these purposes has become very large. To meet these extensive and growing requirements two glass manufactories have already been founded in San Francisco.

The first of these was erected on the Potrero by the Pacific Glass Company in 1862, active operations having been commenced in June of the following year. At these works all kinds of bottle glass except flint are made. They give employment to seventy men and boys, and produced, in 1866, $72,000 worth of wares, and $130,000 in 1867. The establishment contains one furnace with seven open pots for melting, it being the intention of the proprietors to largely increase the capacity of their works in a short time.

The San Francisco Glass Works, erected in 1866, are engaged chiefly in making bottles, jars, demijohns, lamps, chimneys, and druggist's wares. They also manufacture large sized retorts for use in chemical laboratories and acid works. They employ about forty hands, and turned out in 1867 over $40,000 worth of wares.

The white sand required for making the finer qualities of glass is procured from Monterey county, where it exists in large quantities; the next grade comes from Oakland, Alameda county, while that used in making coarser wares is obtained from the hills about San Francisco.

Besides the above works, there is an establishment in the city engaged in making mirrors from French plate glass, about 1,200 large sized pieces of the latter being manufactured annually. Mirrors are also silvered here, and those damaged resilvered. The action of the sea air and the dampness incident to long sea voyages is found to corrode and dim the lustre of the amalgam, materially depreciating the value of imported mirrors, rendering an establishment of this kind indispensable on this coast. The business of cutting, grinding and polishing glass is also well represented in San Francisco by the establishment of John Mallon, who has carried it on there successfully for the last ten years.

## MANUFACTURE OF SALT.

Between the requirements grown out of the demand for this article for culinary uses, for meat packing, the treatment of ores, and the northern fisheries, the consumption is becoming large in California. The principal sources of supply have thus far been the Alameda and Los Angeles salt works, whereat the production is effected by solar evaporation, and Carmen Island, on the coast of Lower California, with considerable importations from Liverpool. There are six mills in San Francisco engaged in grinding the rough salt, four being employed for their owners and two in doing custom work. The quantity of salt ground in the city amounts to between twenty and thirty thousand tons annually, the article thus prepared being designed chiefly for table use, while the coarse is disposed of in the manner above designated.

## SOAP FACTORIES.

There are a large number of these works in the State, the greater number, however, being located in San Francisco. Every variety of the article is made—plain, fancy, and toilet; the raw material being abundant in all parts of California. The different establishments in San Francisco, numbering some dozen or more, produced in 1867 over three and a half million pounds of soap, their capacities being equal to the production of ten million pounds annually. These local factories not only supply the city and a large portion of the interior, but also send considerable quantities to British Columbia, Mexico, Central and South America, and the Sandwich Islands.

In addition to soap, an excellent article of washing powder is manufactured by one of the companies in San Francisco, the amount made in 1867 having reached over three hundred thousand pounds, with the prospect of being rapidly increased.

## CANDLE FACTORIES.

Ever since the business of underground mining began to be extensively practiced, the consumption of candles has been large in this State; none of the attempted substitutes for this article having proved acceptable. For the past six or seven years the quantities used on this coast have been enormous, reaching 175,000 boxes in 1864, and increasing to over 250,000 in 1867. There are now but two factories in the State, both being in San Francisco. Their joint product is about 15,000 boxes per annum. Several other attempts have been made to carry on the manufacture of these articles, but all proved failures owing to constant heavy importations, and powerful trade combinations designed to crush the local manufacturer. One factory, started in 1866, was, after a short success, destroyed by fire. In view of the great abundance of raw stock and the large consumption of candles on the Pacific Coast, it seems a little strange that more of these articles have not been produced at home, notwithstanding the temporary obstacles alluded to above. That additional factories will be erected, not only in San Francisco, but elsewhere in the State, may reasonably be expected, inasmuch as vein and deep channel mining is constantly on the increase, while the imported article often falls short of the standard of excellence required.

### GLUE FACTORY.

The largest establishment in the State engaged in making this article is that of the Pacific Glue Company, at San Francisco, which, for several years past, has produced enough to serve not only home wants but a considerable surplus for exportation, thus furnishing, in a small way, another example of the manner in which California has been able to send her products and wares to the very markets whence, but a few years since, she drew her supplies. Neatsfoot oil is also made in considerable quantities at this factory, the material for this purpose, as well also as the parings of skins, and other parts of animals required for making glue, being abundant in California.

### CHEMICAL AND ACID FACTORIES.

The only two extensive factories of this kind on the coast are situated in San Francisco. The older of these, located at the Mission Dolores, was founded in 1855, since which time it has been steadily and profitably engaged in making all the various articles used in metallurgic, photographic, and manufacturing establishments, as well also as those required in the reduction of ores—all the acids employed by the United States Branch Mint having been supplied by these works.

The Golden City Chemical Works, located at the corner of 7th and Townsend streets, went into operation at the close of 1866. Nitric, Sulphuric, and Muriatic Acid, as well as Carbonate of Soda, are manufactured here, and this establishment now supplies the greater portion of all the acids used in California.

There are other Chemical Works in San Francisco, engaged chiefly in the manufacture of druggists' materials.

Most of the crude substances required in these works, including sulphur, is obtained in California—the nitrate of soda being brought from Chili and Mexico.

## MATCHES.

There are several factories in San Francisco engaged in making these articles; the total production not being much, if any, less than 10,000 gross monthly. Six or seven years ago our matches were all imported; now, California exports several thousand gross annually. Those made here are mostly of the style known as "block matches"—the timber used being exclusively Port Orford cedar, which, besides splitting easily, is a light and inflammable wood.

## OIL WORKS.

Several establishments have been erected in different parts of the State for carrying on the business of expressing, manufacturing, and refining the various descriptions of oils, the greater number of these works being located in or around the city of San Francisco. Of the latter, the two most extensive are those owned by Stanford Brothers, and Messrs. Hayward & Coleman, engaged in refining the crude petroleum, or earth oil, found in many parts of California. The former of these works produced about forty-five thousand, and the latter about fifty thousand gallons of the refined article in 1866, less having been made the following year, owing to heavy importations from the East, and the low prices ruling in consequence. The above, with one or two other smaller establishments in the city, have a capacity to distill over a million gallons of oil annually, and will probably resume operations in a short time. An oil refinery has also been put up at San Buenaventura, Santa Barbara county, and another near Gilroy, Santa Clara county, the latter erected several years ago, and though of small capacity, has been run for some time with success.

The crude material for use of the San Francisco works is mostly obtained from Santa Barbara county, where, as well as in many other of the southern counties, it exists in great abundance, and generally under conditions very favorable for collection; the method most commonly adopted for this purpose, being to drive a system of connecting adits into the earth in the vicinity of the natural springs, and thus gathering the seepage of large areas, conduct it into a reservoir at the mouth of the main adit. Most of the crude petroleum found on this coast being inspissated and tar-like, is rather more difficult of distillation than the products of the Pennsylvania wells; and, although it does not make so good an illuminating fluid, it produces a better lubricating oil than the Eastern petroleum, while it promises also for the same reason to become a greatly superior steam fuel.

The Pacific Linseed Oil and Lead Works, started in San Franisco in 1866, and the first and only establishment of the kind in the State, manufacture linseed oil, oil cake, and also express oil from the castor bean, mustard, sunflower, rape, and other seed. The mill, driven by a fifty horse power steam engine, is large and perfect in all its appointments, each department containing every requisite appliance and recent improvement. Since their late enlargement, these works employ about twenty men, and have a capacity to crush twenty thousand bushels of flax seed monthly, and to manufacture over three hundred thousand gallons of oil annually, every variety of oil made here being of admitted superiority over the imported.

There is connected with this establishment a mill for grinding in oil, white lead and zinc paints, and for making paints of every variety.

The Phœnix Works, for refining sperm and whale oils, also located in San Francisco, are capable of handling about four hundred gallons per day, having refined at the rate of sixty thousand gallons annually for the past two years.

In the fall of 1867 a small mill was projected at Marysville, Yuba county, for extracting oil from the castor bean, flax, mustard, and such other oleaginous seeds as may be grown and procured in that region. Early in the following year this mill had been completed, and was about to commence operations under encouraging auspices.

Heretofore the Pacific mill, in San Francisco, has been obliged to import its stock of linseed from Calcutta and other foreign places, but it is thought a sufficiency of this seed will be raised in the course of a year or two at home to meet all its requirements. Both flax and the castor oil bean can be grown in California without trouble, producing, when planted in the right kind of soils, certain and prolific crops; and now that the farmers have not only a home market for all they can raise, but, through the construction of mills, are insured a competition likely to maintain prices at a fair standard, it is expected that the cultivation of these, and other oil bearing plants and shrubs, will be extensively engaged in.

The mustard seed, which can always be had in this State, yields a sweet, limpid oil, valuable for cooking purposes, and even for table use, some preferring it to butter, and certain classes making it a common substitute for hog's lard. It is also extensively used to adulterate olive oil, if the addition of an equally good or better article can be called an adulteration, the only object in so employing it being its greater cheapness.

## RICE MILLS.

There are two of these establishments in San Francisco, both driven by steam. They each clean about 3,000,000 pounds of this cereal annually, though they have a capacity to mill five or six times that amount. The quantity imported into California, where it forms the chief staple of Chinese subsistence, is about 23,000,000 pounds per year, of which a small quantity arrives in the husk, being what is called "paddy." Three fourths of the imported rice is brought from China, the balance coming from Calcutta, Siam, Manila, and the Sandwich Islands. Usually this grain requires to be put through three operations in the process of hulling, though a single one, by the employment of an ingenious machine of California invention, answers at these mills. By the use of this machine, the process is not only cheapened, but the grain is less broken. Under existing tariff regulations, seventy-five per cent. of the rice brought here is cleaned in China, though it could be done more cheaply and efficiently in San Francisco. The only reason that any is cleaned here is, that it can be done so much better at our own mills, and with greater saving of the grain.

## LIME AND CEMENT.

The only cement mill in this State is situated at Benicia, for a more particular description of which see Solano county. The rock used, an argillaceous limestone, is abundant at that place, and also occurs at Martinez, on the opposite side of the Straits of Carquinez. These works have capacity to make over two hundred barrels of cement daily, more than enough to supply the wants of the entire coast. The article manufactured here is equal to the best imported, and being supplied for a less price ($3 per barrel) than the latter can be afforded at, is likely soon to exclude it entirely from the market. These works, which were destroyed by fire in the early fall of 1867, having been rebuilt on a much larger scale than before, are now turning out one hundred and fifty barrels of cement daily.

Cement works have recently been put up in Oregon, which are likely to produce a sufficiency of the article for that State and the adjoining territories.

The consumption on this coast, now rapidly increasing, has heretofore been about thirty thousand barrels annually, the most of it imported from the Eastern States.

The total annual production of lime throughout the State amounts to about one hundred and thirty thousand barrels, of which one hundred and five thousand barrels are received at San Francisco, the larger portion of it being made at Santa Cruz.

## LEAD WORKS.

The only establishment on this coast for manufacturing this metal into the various forms required for commerce, is that of Thos. H. Selby & Co., in the city of San Francisco. These works, erected in 1865, have a large manufacturing capacity, having been projected with reference to the future requirements likely to arise. The buildings are extensive and substantial, comprising a shot tower, 70 by 80 feet square at the base, and 200 feet high. The propulsive power is furnished by a large steam engine; working force employed, sixteen hands; value of productions in 1867, $200,000. At these works, not only shot of every description, but also minnie balls, sheet lead, and lead pipe are made, several hundred tons of the latter having been turned out here in 1867.

About sixteen hundred tons of crude lead are melted up annually, the supply having until recently been imported. Early in 1868 this company erected lead smelting works at Black Point, in the northwestern part of the city, whereat they are now producing lead from argentiferous galena obtained from the mines of the Castle Dome District, a few miles east of the Colorado river, in Arizona. It is believed that the argentiferous galena ores found in many parts of this State can also be used to advantage, when facilities shall be afforded for their cheaper transportation, as some of them are known to contain a large per centage of both lead and silver.

## MARBLE WORKS AND QUARRIES.

Not until within the last three or four years was the business of quarrying, or manufacturing marble, engaged in to any extent in California, nearly every thing required in this line having been previously imported already made. Much of the material is still imported from abroad, the most of it from Italy, and worked here to order; though, for several years past, considerable quantities of this stone have been taken from the several quarries now open in this State.

The two principal works engaged in manufacturing marble are located in San Francisco, the value of their joint products amounting to about $200,000 yearly. The Pioneer Works, driven by steam, employ on an average thirty-five men—make tombstones, monuments, furniture, etc., and import most of their material. At the other yard, from twelve to fifteen hands are employed, and about the same style of articles are made.

The first quarry opened in the State was that at Indian Diggings, El Dorado county, in 1857, since which time large quantities have been extracted. It is of the clouded variety, and is much used for memorial purposes. Near Dayton, Amador county, a quarry of white marble, slightly veined, has been opened, and considerable quantities of the stone brought to San Francisco, to be used for building purposes. Near Columbia, Tuolumne county, is another extensive formation of marble, from which large quantities of stone, some of the blocks of great size, have been broken out. In Placer county, contiguous to the line of the Central Pacific Railroad, there is a quarry of variegated black marble, considered valuable. In Solano county, and in many other parts of the State, marble of nearly every description abounds; the only reason that these deposits have not been more extensively worked, being the very limited demand for the article on this coast.

## POTTERIES.

There are a number of potteries in and around San Francisco, and two or three in other parts of the State. The works at the Mission Dolores manufacture, from a clay obtained in Sacramento county, every description of stone-ware, and also wares for acid factories, chemical works, etc. The establishment at North Beach is engaged chiefly in making sewer pipes. At San Antonio, Contra Costa county, there is quite an extensive pottery, whereat nearly every kind of stone and earthenware is made, the clay being obtained from a bed near by. There are also similar works in Sacramento, and at Antioch, Contra Costa county, fire-bricks and crucibles, besides stone-ware, being made at the latter, the material therefor being obtained from a seam of clay found in the Black Diamond Coal Mine.

Clays suitable for making not only stone and earthenware, but also the finer kinds of crockery as well as fire-bricks, crucibles, etc., are found in many parts of the State, and it is highly probable that nearly everything required in this line will in the course of a few years be supplied by our local potteries.

## BOOTS AND SHOES.

Prior to 1864 there were no extensive factories for making these articles in the State, the business being confined to a few small shops doing custom work.

George K. Porter, of Santa Cruz, for many years engaged in carrying on a tannery at Soquel, in that county, was the pioneer in the business, having hired from the State forty or fifty convicts for working up the products of his tannery into the coarser kinds of boots and shoes.

All the larger establishments of this class in the State are located in or near the city of San Francisco, the leading one being the Pacific Boot and Shoe Factory, near the Mission Dolores, founded in 1866. The main building is forty by eighty feet, three and a half stories high, with a tannery attached, where all the leather worked up is made. The entire number of hands employed is one hundred and thirty. Steam power is used, and all the latest and most approved styles of machinery have been introduced.

At the factory of Wentworth, Hobart & Co., situated within the city, nearly every variety of goods is manufactured; over 11,000 pairs of boots and shoes, and about 5,000 sides of sole and upper leather being worked up monthly. Hein & Bray employ seventy-five men, and turn out daily 78 pairs of kip and calf boots of very superior stock and workmanship. Buckingham & Hecht also carry on an extensive business in this line, the wares produced by this house being of marked excellence. A company of capitalists having recently purchased a tract of land near Clinton, Alameda county, are now erecting thereon a large factory with houses for workmen. The place is to be named Lynn, after the famous cordwainer's city in Massachusetts.

Notwithstanding the large quantities of boots and shoes manufactured in the State, the importations of these articles have thus far continued to increase every year, immense numbers having been sent to this market *via* Panama to be forced off at auction. The imports for 1865 amounted to 38,875 packages; for 1866, to 47,349; for 1867, to 66,672 packages. Such, however, is the superiority of the California made wares, both on account of the greater excellence of the stock and care in the making up, that they have always commanded from ten to fifteen per cent. higher prices than the imported article; and so great is the consumption of boots and shoes on the coast that the business of their manufacture here is steadily expanding—the value of the wares turned out at domestic factories in 1867 having been estimated at $550,000.

## SADDLERY AND HARNESS.

Both these branches of business, owing to the peculiar requirements of the Pacific coast in this line of wares, have been very extensively prosecuted in California. The superior model of the saddle and other riding equipments found in use here, when the Americans arrived in the country, led to their universal adoption by our people, precluding the importation of other styles almost entirely. So, also, the harness required, being mostly designed for teaming into the mountains, and other heavy service, could be made here to advantage, the leather of domestic tan being furthermore preferable to any elsewhere procurable.

The heaviest manufacturers, and the earliest house to engage in this branch of business in the State, was that of Messrs. Main & Winchester, of San Francisco, who, besides their principal establishment in the city, extended their trade at an early day to many points in the interior; their energy, and the excellence of the articles made, securing to them for a time a large proportion of the trade of the entire coast. They are still largely and actively engaged in the business, the force constantly employed consisting of sixty men in the saddlery and harness department, and twelve in the manufacture of whips; the annual value of the products turned out at their extensive establishment being about $80,000, equivalent to nearly one half the entire productions of the city. There are several other saddle and harness manufactories in the city, nearly every considerable town in the interior of the State also containing one or more.

## WAGONS, CARRIAGES, AGRICULTURAL IMPLEMENTS, CARS, ETC.

For several years after the American settlement of California, nearly every description of vehicle, except such wagons as had been brought across the plains, were imported from abroad. For the past eight or ten years, however, the manufacture of carriages of all kinds has been largely carried on all over the State; the greater portion of light vehicles, such as coaches, buggies, express wagons, etc., as well as most of the trucks and drays, being made in San Francisco, where the number of workmen employed in this line amounts to about two hundred and fifty, the value of the productions turned out annually exceeding half a million of dollars.

It happens in regard to certain classes of vehicles, that they can be made to suit the peculiar service for which they are required better here than in other countries, those manufactured in particular parts of the State being also generally preferred in those localities to any others, the makers, from long observation, being better able to adapt them to the special business they are to be employed in. Thus, at Sacramento, Stockton, and Marysville, the best wagons are built for heavy freighting into the mines, while in the mining towns, those best adapted for hauling ores are constructed.

The business is steadily on the increase, and it is not probable that many wagons, except the more costly styles of coaches and buggies, will be imported after a year or two more, nearly every description of vehicle of domestic make being preferred to the foreign, even at a considerable increase of cost.

At present the home made article supplies about ninety per cent. of the entire demand. The manufacture of cars, for railroads and use in the mines, is also fast growing into an important business in this State, all the leading railroad companies having large shops of their own for making and repairing their rolling stock. A great many of these vehicles are also manufactured at private shops in San Francisco. This branch of business, though now considerable, is small compared with what it will probably be in the course of a few years.

In view of the heavy cost attending the importation of such bulky articles as agricultural implements, it would, at first glance, be supposed that all required on this coast would be made here; and such would be the case, were their manufacture not prevented, in most instances, by their being patent inventions. As it is, however, many of the more important and cumbersome are now being constructed here, while a very large proportion of ploughs, and other more simple implements, are made in large numbers, there having been over six thousand of the former manufactured in the State during the past two years. The following list indicates very nearly the number and value of these implements imported into the State during the year 1866, the importations for 1867 having been about the same: 700 ploughs, $91,000; 300 threshers, $180,000; 1,500 mowers, $150,000; 1,000 harrows, $10,000; 500 grain sowers, $15,000; 200 cultivators, $6,000; 200 gang ploughs, $10,000; 100 hay presses, $10,000; 1,000 horse rakes, $15,000; total, $487,000; besides which, great numbers of churns, wheelbarrows, scythes and snaths, and a vast number of other farming and dairy utensils of secondary importance were imported.

What was said in regard to the preference given to California made wagons and harness applies with equal force to agricultural utensils, many farmers being unwilling to use any other than those made in their own neighborhood—this being more especially true of ploughs. Already a number of our citizens have secured patents for improvements made in this department of invention, the steam plough promising very large gains to the farmer, being the most valuable and noteworthy of these California contributions to practical agriculture. Improvements have also been made here in the gang plough of such value as to warrant their being secured by patent, these implements now being made in various parts of the State.

Threshers, mowers, and reapers, have also been made at several places, all of which have given equal satisfaction with those imported. It is unfortunate that California grows but few woods well adapted to car and carriage making, nearly all the better qualities of hard timber employed for this purpose being brought from the Eastern States.

## FURNITURE.

For several years even the most common articles of furniture used in California were brought from beyond the sea; and although much is now made here, the importations of the more costly kinds of cabinet ware still continue to be large. There are several large establishments in San Francisco engaged in making and finishing furniture; the most extensive of which is that of Goodwin & Co., whose principal factory and depot, situated on Pine street, is four stories high besides the basement, and has a frontage of eighty-two feet with a depth of ninety-seven feet. It is not only the largest establishment of the kind on the coast, but is surpassed only by a few in the leading Eastern cities. This firm give employment to one hundred and thirty men, and have a capital invested in their business of over one million dollars. They expend $500,000 annually in the purchase and manufacture of furniture in New York and Boston, their sales in 1867 having amounted to $800,000, a sum which it is expected will be considerably exceeded the following year.

W. G. Weir also manufactures a good deal of furniture, employing at his shops in Hayes Valley over forty men. The value of wares made in 1867 reached $80,000, which the proprietor expects to double in 1868, having lately added much new machinery and otherwise increased the capacity of his shops.

In addition to these, there are several other smaller establishments in the city, the entire number of men steadily engaged in this business being about three hundred and twenty, and the total annual value of wares made and completed amounting to nearly half a million dollars.

Of the natural woods most used in cabinet work, the principal are Oregon Pine, Spanish Cedar, Redwood, Sugar Pine, White Cedar and California Laurel; this coast not affording any great variety of the finer kinds of wood, the most of which is imported.

## MATTING.

The manufacture of Manila matting commenced on a small scale in San Francisco, May, 1866, and since largely extended, has meantime served to greatly check importations, while it has reduced the price of this article from $1.50 to 75 cts. per yard. The imported is subject to a tariff of 30 per cent.; yet, so greatly superior is the machinery here, and the other facilities for manufacturing, over those enjoyed abroad, that an intrinsically better article is made, at the same time that the price is reduced. The material used, consisting of yarn spun from the outside bark of the cocoanut tree, is brought directly from Manila, the manufactured matting imported coming mostly from China.

## PIANOS, ORGANS AND BILLIARD TABLES.

There are but three shops in the State whereat pianos are made, these all being in San Francisco. They employ an average of twenty men, and have facilities of machinery, etc., to make two hundred instruments annually, the actual production being scarcely half that number. Jacob Zech, the pioneer maker on this coast, has taken many premiums at the several State and other leading fairs, over foreign competitors. At these shops all the different kinds of pianos are made, many of the square and upright instruments, with iron frames, having been lately constructed. The woods used are mostly of California growth, and the instruments produced here are said to be equal in tone and workmanship to any made elsewhere, while they stand the climate better. The principal obstacles in the way of the successful manufacture in California are found in the high prices of labor and the limited market.

There is but one manufactory of organs in the State, that of Joseph Mayer, of San Francisco, established in 1860, and whereat there have since been twelve of these instruments made, all of superior tone and power, eight of the number having already been set up in leading churches in San Francisco. Two of these instruments were made in 1867, at a cost of $3,000 each. The material employed is of California production throughout—every part being made on the ground.

There are three shops where billiard tables and their appendages are made, in San Francisco. The number of men employed is about forty-five ; the value of tables manufactured, about $200,000 annually; number of tables turned out being from 120 to 130. Many of the native woods of the coast are used in making these tables.

## BREWERIES AND DISTILLERIES.

There are about one hundred and twenty-five breweries in the State, of which number twenty-four are located in San Francisco. There is not a town in the interior of any considerable size but contains one or more of these establishments, though some are conducted on a small scale, making only enough beer to meet the local demand.

The quantity of malt liquor brewed in San Francisco during the year 1866 reached 2,500,000 gallons—the amount made the following year having been somewhat larger. Notwithstanding this immense production, the importations continue to be large, having summed up 1,398 hogsheads, 14,110 casks and barrels, 4,788 cases, and 360 tierces, for the year 1867. The malt is made wholly from California barley, while most of the hops now used are also of home growth.

While there are numerous small distilleries in the State, the two leading ones, at which three fourths of all the spirits manufactured are made, are located in San Francisco.

The works of J. Dows & Co., established fourteen years ago, have a daily capacity to make 1,000 gallons of pure spirits, to the production of which they are chiefly confined. The Pacific Distillery turned out, in 1867, 133,000 gallons of spirits, though it is capable of making more than four times that amount. The capacity of all the distilleries in San Francisco is set down at about 1,000,000 gallons per annum ; the entire product for 1867 having been 700,000 gallons, as against 430,000 the preceding year. The material used for distillation consists of barley, wheat, Indian corn, and rice ; Sandwich Island molasses being substituted when these cereals are scarce, or unusually costly.

## BROOMS, AND BROOM CORN.

As already remarked, broom corn thrives on most of the rich alluvial lands of the State, the stalk growing vigorously, and the brush being straight, clean and heavy. The tule lands, where sufficiently dry, are especially adapted to its culture. The growing of this cane, entered upon some eight or ten years ago, is every year extending, patches of it being raised in nearly every agricultural county of the State —Yuba, Sutter, and Butte taking the lead.

There are now fifteen broom factories in California, ten of which are located in San Francisco. Some of these factories are extensive, while others are on a small scale, the whole number of brooms made in the State, during the year 1867, having been 40,000 dozen, valued at $150,000, The price of the corn ranges from $50 to $65 per ton, and of the brooms, from $3 to $6 per dozen, according to quality. With this extensive growth and home manufacture, everything in this line has ceased to be imported, California having a large yearly surplus to spare, which finds a market in all the adjacent States and Territories, many also being sent to British Columbia, the Amoor river, China, Australia, Sandwich Islands, Mexico, etc.

## WOOD AND WILLOW WARE.

There are two wooden ware factories in the State, both being in San Francisco. They employ about eighty hands, are driven by steam power, make every variety of article common in their line, and, it is conceded, of a quality equal to those imported ; the quantity of which has been greatly diminished, some descriptions being wholly discontinued since the starting of these local factories, which have also reduced prices fully twenty-five per cent. The material used consists mostly of pine, cedar, and redwood; of California and Oregon growth, about 2,600 cords of which, besides 100,000 hazel hoops for powder kegs, eighty tons of hoop iron bands, and large quantities of other materials are consumed annually. The cheapness and excellence of the stock required for making these wares will always be such as to give the Pacific coast factories great advantages over those in most other countries. The two San Francisco establishments turned out during the year 1867, 30,000 tubs; 8,000 dozen pails; 2,400 dozen washboards; 180,000 broom handles, and 70,000 powder kegs, besides large quantities of other wares pertinent to the trade.

## CLOTHING, SHIRTS, ETC.

The value of these articles manufactured annually in this State amounts to about one and a quarter million dollars. The greater portion of them is made in the city of San Francisco, where there are four or five firms and companies engaged in the business. They depend chiefly on the local woolen mills for their fabrics, and as these are of admitted superiority, the clothing made is always of marked excellence, commanding extremely high prices. Most of the larger clothing manufacturers include shirtmaking in their business, though there are two or three establishments confined wholly to the making of these articles. The number of hands employed in these several branches is between four and five hundred, independent of those working in the tailor shops, of which there are a large number in the city.

## CALIFORNIA TYPE FOUNDRY.

Although the manufacture of type, stereotyping, and electrotyping has been carried on in San Francisco for several years in a small way, not until January, 1867, was the business introduced on an extended and systematic plan, when Messrs. Wm. & Geo. L. Faulkner, having completed their foundry, entered vigorously on the manufacture of type of every description. This firm had for many years previously been engaged in importing type and printers' materials, having been among the first parties on the coast to embark in the business. Over 30,000 pounds of type were turned out at this foundry the first year, most of the metal used having been obtained from the mines of this State and Nevada. This firm also carries on the business of stereotyping and electrotyping in conjunction with the above branch of the business, the type on which this book is printed having been made at their foundry, as well also as the stereotype plates taken from the same.

There being about three hundred printing offices on the coast, the demand for the supplies in this line is large and rapidly increasing. These requirements the Messrs. Faulkner expect to meet with home made material, equal in quality, and at prices below that of the imported. Already they have furnished full suits of type for most of the newspapers on the coast, and it seems probable that the importation of printers' material, heretofore large, will for the future be much curtailed by the products of this foundry.

## CIGAR MANUFACTURES.

This business is carried on extensively in San Francisco, there being over one hundred shops in the city, employing seven hundred and sixty hands, nearly all of them Chinese. The rapidity with which this trade has grown up is indicated by the fact that scarcely any cigars were made here in 1860, while the number had increased to 11,000,000 in 1865; to 23,500,000 in 1866; and to 35,000,000 in 1867; in addition to which 4,000,000 Havana cigars were that year imported, and nearly as many more smuggled into the country—making an aggregate of nearly 45,000,000. If to this is added 5,000,000, on account of cigars made in the interior, we have a total stock accumulated in the country approximating 50,000,000 of these articles within a single year.

The tax paid upon cigars made in the State amounted, in 1864, to less than $2,000. In 1866 it reached $212,500; while, in 1867, though the manufacture had largely increased, the revenue from it fell off, in consequence of a reduction in the excise duty.

Of the 40,000,000 cigars manufactured in the State during the year 1867, about 25,000,000 were made from pure seed leaf; 11,000,000 from seed leaf and Havana; and the balance from pure Havana. Nearly the whole of the raw material used here is imported—the most of it coming from the Eastern States and Havana; over 3,000 cases of tobacco are imported annually. The experiments made at cultivating this plant in California have failed to prove remunerative to the grower, or wholly satisfactory to the consumer. The causes of the failure are variously attributed to defects in the soil and climate, and to carelessness and ignorance in the curing of the leaf—justice, perhaps, requiring that the agencies of this failure should be about equally distributed among the several causes thus assigned for it.

As our manufacturers have been able to place upon the market, at a less price, fully as good an article as that imported from domestic Atlantic ports of supply, shipments from the latter have nearly ceased; those imported consisting of Havana, brought in under a duty of $65 per thousand.

## FURS.

Prior to the American occupation of California, the business of trapping and hunting fur-bearing animals, and bartering in their peltries, constituted one of the leading pursuits throughout the countries west of the Rocky Mountains—San Francisco having been formerly one of the centres of this trade on the North Pacific. The men engaged in these pursuits were the first to explore these extensive regions, and to acquaint the world with their resources and geography; their labors having meanwhile enriched the companies in whose services they were employed. This traffic, which at one time attained to large proportions, was suddenly curtailed by the discovery of gold in California, that event having drawn away most of the employés of these companies, and otherwise interfered to check their operations. The latter, however, were still continued on a diminished scale in the British and Russian possessions to the north, though the quantities of furs reaching San Francisco was much less than formerly. Still, about $500,000 worth have arrived at that market annually, from various points on the northern coast and in the interior, the supplies from the latter source having been on the increase for the past several years. Of the furs reaching that city, about $40,000 worth of the choicer kinds are selected and made up to meet the requirements of the domestic trade, the balance being shipped abroad. These furs comprise a very broad range, the more valuable kinds consisting of otter, beaver, silver fox, sable, mink, and martin, though the wolf, squirrel, common fox, and almost every other wild animal, contributes towards filling up the variety. There are three houses engaged in this line of manufacture in San Francisco, the whole employing sixty-five hands, and turning out products valued at about $200,000.

Since the purchase of Alaska by the United States, the duty on Russian furs having been removed, our local furriers are able to supply all home demands, at prices that forbid competition. Since the acquisition of this territory, a company having a large capital has been formed in San Francisco, to prosecute the fur trade in that region, a movement that promises to largely increase the products from that quarter in the future.

## MEAT PACKING AND CURING.

This branch of business is now largely carried on, not only in San Francisco, but throughout many parts of California and Oregon; the quantity of bacon, pork, ham, lard, and salt beef produced increasing rapidly every year. Already this coast, which, but a few years ago, drew the bulk of these articles from the East, is independent of all outside sources of supply, and it seems probable that shipments to California will hereafter be small. Swine, it is found, can be raised here with great facility, the tule and other wild roots, and the oak mast, being ample, in the localities where met with, to subsist and fatten these animals with but little expense or care on the part of the owners. For the California and Oregon cured meats, a great preference is generally given over all other kinds; the government commissariat, finding them more fully up to the requirements of the department, regard them with special favor.

The climate of San Francisco, from its low and equable temperature throughout the year, being particularly well suited for the business of meat packing and curing, most of the larger establishments in this line have been located there. It is estimated that there are slaughtered in that city annually 58,000 hogs, of the average weight of 110 pounds, about eighty per cent. of which is cured into ham and bacon. The number of neat cattle annually slaughtered is also very large, though a smaller proportion of the meat is smoked or packed down.

## DRIED AND PRESERVED FRUITS, VEGETABLES, ETC.

But a few years since everything consumed in this line upon the Pacific coast was sent to us from abroad. Now, although we still continue to receive certain kinds from the East, the importation of others has entirely ceased, and we are exporting considerable quantities every year, not only to the adjacent State of Nevada and the Territories beyond, but also to domestic Atlantic ports, our dried fruits being especially esteemed wherever they are sent.

The largest establishment in this line on the coast, that of Messrs. Cutting & Co., San Francisco, put up, during the year 1867, 5,000 cases of pickles; 6,500 of tomatoes; 3,000 of fresh peaches; 3,000 cases of jellies; 1,000 of jams; 1,000 cases of peas; 500 cases of beans, and 2,000 of assorted fruits—making a total of 22,000 cases of these articles, besides a proportionate quantity of ketchups, vegetables and canned meats. This firm have a capital of $165,000 invested in the business, and employ, during the active season, over one hundred hands, it being estimated that they do over two thirds of all that is transacted in this line in San Francisco.

The business of fruit drying is mostly carried on in the interior and bay counties, where the greater portion of it is grown, many nurserymen and families curing, besides enough for home use, a quantity for market.

## MISCELLANEOUS MANUFACTURES.

Besides the foregoing articles there are many others manufactured on a small scale in the State, or which are in other respects of but secondary importance. Among these, the following, confined to San Francisco, may be enumerated, as most entitled to notice.

Daniel Callaghan, manufacturer of yeast powders, made in the year 1866, 2,000 gross, and in 1867, 3,000 gross of this article; besides producing, in the latter year, 90,000 pounds of cream of tartar, and 250,000 pounds of soda and saleratus.

A beginning has been made at manufacturing oil cloths, a business that can hardly fail to increase, as the consumption of this article is large, and prices of the imported always rule high. Book-binding, and the manufacturing of blank books, is extensively carried on—a San Francisco firm having erected a shop at the State Prison, where they employ fifty of the convicts in the different branches of the business. Over a million dollars worth of coffee and spices are prepared in San Francisco annually—about fifty men being employed at the business. A company has lately been formed in that city with a capital of $100,000 to carry on the manufacture of chiccory, a root that can be grown with facility in all parts of the State. There are now several mills engaged in grinding it, and it is calculated that, after supplying all home demands, the State will produce 1,000,000 pounds for export the present year. Over half a million pounds of maccarroni and vermicelli are made every year—the home made article being preferred to the foreign.

There are also two shops at which blacksmiths' bellows and similar utensils are made; two gold-beaters' shops ; a large number of manufacturing jewelers; a factory for making buckskin gloves; soap-stone, starch, glue, soap-root hair, and straw works; several metallurgical works, whereat ores of all kinds are assayed and reduced, either on a large scale or in small quantities, as practical tests in prospecting mines; a number of large assaying establishments, where, besides the mere assaying and analysing of ores and metals, the latter are refined, parted and run into bars, preparing them for the uses of exchange and commerce; two or three companies engaged in laying down asphaltum sidewalks, roofs, etc.; also, others engaged in putting down the Nicolson pavement, with which large sections of the streets of San Francisco are now laid; fifteen factories where bags, sacks, etc, are made, mostly by sewing machines; two large shops where superior articles of cutlery are manufactured, the most of it being made to order; twelve extensive cooperages; two establishments for making fire-works, the products of which have been found so superior to all others as to have greatly diminished importations from China, at least for the consumption of our own people. In 1867, 12,000 feet of hose and $10,000 worth of leather belting were made, requiring 3,000 sides of leather. The hose manufactured here is found to greatly outwear that of Eastern make, owing mainly to the superior character of California leather.

Mouldings, stairs, doors, sash and blinds, boxes, looking-glasses and picture frames, show cases, etc., formerly nearly all imported, are now extensively manufactured in California—the greater portion being made in San Francisco. Early in 1868 a company was formed in that city for the purpose of engaging largely in the manufacture of doors, blinds, sash and mouldings, intending to start operations in the course of a few months. There are several mills in San Francisco where one or more of the above branches is carried on—besides a number of smaller capacity located in different towns of the interior.

Works have been erected in Marysville, Yuba county, for the manufacture of pitch, rosin, and turpentine, the raw material being obtained by tapping the trees in the extensive pineries that exist along the foot-hills of that and adjacent counties. The quantity made last year reached but little over twenty thousand gallons, not much more than half the amount produced the preceding year, and scarcely one third of what it is expected will be turned out in 1868. The home made article is equal to the imported, and could be produced in almost any quantity and at less price than the Eastern, were it not for the cost of freight from the interior to San Francisco, the central market.

## WORKS PROJECTED, OR IN PROGRESS.

The machinery for a silk factory has been imported into the State, and although its erection may be deferred for a time, owing to the silk growers preferring to sell their eggs rather than rear the worms for making the textile, there is, no doubt, but this mill will eventually be put up and run with profit.

Early in 1868 the Oakland Cotton Mill Company had taken preliminary measures for putting up in San Mateo county a mill for manufacturing fabrics from flax; and as some three or four hundred acres had that year been sown in the bay counties with the seed of this plant, besides a considerable area in the interior, it is very probable that the proposed mill will in good time be erected. As bags can be furnished from flax at about half the cost of burlap sacks, and as the construction of this mill will make a market for their lint, the farming community will, no doubt, extend to the project every possible encouragement.

The Natoma Water Company, an association directed by sagacious and energetic men, and possessed of ample means, having secured a franchise to all the water of the American river, are now engaged constructing a canal of sufficient capacity to carry the entire stream at ordinary stages, it having thus been appropriated and made available for propulsive purposes. The point selected for diverting the river is situated one mile and five-eighths above the town of Folsom, through which the canal is to extend, having a fall in this distance of one hundred and fifteen feet, whereby a three thousand horse power will be generated, with the river at its lowest stage, and nearly double that amount for more than one half the year—being, it is estimated, equivalent to that which propels the immense factories at Lowell. The canal of this company having nearly reached completion in the spring of 1868, the dam, a substantial structure to be built wholly of granite, was expected to be finished the following summer. It is their design to sell portions of the water power to such parties as may be desirous of using it for manufacturing purposes; and as this locality is central and accessible by railroad, besides being near the extensive granite quarries of Folsom, whence the best of building material can be easily obtained, there is every likelihood that a large and prosperous manufacturing town will ultimately grow up at this place.

In reference to the manufacturing interests of California, it may, in conclusion, be observed, that under the tendency to cheaper labor and capital, the growing confidence felt in the future of California, and the expectation of its rapid and permanent settlement, a variety of new branches are constantly being introduced, while many of the earlier established and more important are being extended. And, yet, so broad is this field that some important departments of manufactures have thus far been wholly overlooked or are but feebly represented, affording here many excellent openings for capital, skilled labor and well directed enterprise.

# CHAPTER XII.

## CITY AND COUNTY OF SAN FRANCISCO.

Situation, Topography, etc.—Early Settlement and Subsequent Progress—Street Grades, Public Grounds, etc.—Improvement of Water Front—Style and Peculiarities of Buildings—Fear of Earthquakes, and its Effects—Churches, and Places of Public Worship—Theatres, and other Places of Amusement—Scientific, Social, Literary, and Eleemosynary Institutions—Number of Inhabitants—Diversity of Races, Ideas and Customs—Juvenile Population—Manufacturing Status, etc.—Educational System—Public Schools, Colleges, Seminaries and Private Institutions of Learning—Value of City Property—Municipal Income, Debt and Expenditures—Buildings, Improvements, etc.—Police and Fire Departments—Cemeteries, Public Gardens, Homestead Associations—City Railroads—Gas Works and Water Works—Markets—Banking Institutions and Insurance Companies—United States Branch Mint—Advantages of Position—Foreign Commerce and Domestic Trade—Bullion Products—Passenger Arrivals, etc.

### SITUATION, TOPOGRAPHY, ETC.

The city and county of San Francisco embrace one municipality, the act of consolidation having taken effect July 1, 1856. The county comprises the northern end of a peninsula, about twenty-five miles long, formed by the bay of San Francisco on the east and the Pacific ocean on the west, its entire area covering a space of 26,861 acres, including the Presidio reservation, of 1,500 acres, belonging to the general government. The city occupies the extreme northern point of this peninsula, which is here about four miles wide, being covered for the most part with high hills and sandy knolls, separated by small valleys, ravines, and elevated plateaux, the bay being at most points bordered by extensive stretches of sand-beach and salt-marsh, or overlooked by high hills, terminating on the water side in steep bluffs and rocky headlands. The loftier of these hills, composed of solid earth and rock, vary from 250 to 400 feet in height, the sand-knolls being from 60 to 100 feet high. Owing to these inequalities, the grading of the streets has been expensive, and in places long delayed, it being, even in densely peopled localities, but partially completed.

## EARLY SETTLEMENT AND SUBSEQUENT PROGRESS.

Prior to 1835 the present site of the city was wholly uninhabited, what few people there were in the neighborhood residing at the Presidio and the Mission Dolores. Vessels entering the harbor anchored off the Presidio, that being the "embarcadero" for the Mission, which was then the principal point of business. In the historical portion of this volume will be found a sketch of the early settlement of San Francisco, the name adopted for the town in 1847, it having previously been called Yerba Buena, the name still retained by the large island in the bay opposite the city.

Having already become an active village, with a population of several hundred, the growth of the place, greatly accelerated by the discovery of gold in 1848, expanded with unexampled rapidity on the arrival of the new immigration, a little more than one year thereafter. Its progress has since been steady and healthful, the establishment of manufactures, and the unbounded confidence felt in its future, having greatly hastened its growth during the past few years. But in its recent advancement it has by no means outstripped the requirements of its business and population, both of which have fully kept pace with its growth. The city now covers an area more than double that occupied by it ten years ago, its population and local industries having increased in a ratio even greater than its territorial expansion.

## STREET GRADES, PUBLIC GROUNDS, ETC.

It is unfortunate that the city was originally projected with so little regard to regularity, to the natural inequalities of surface and its future wants as relates to width of streets, reservation of grounds for parks, public buildings, etc.; owing to which, the inhabitants have already been subject to great inconvenience and expense in attempting to partially supply these omissions and remedy these defects. Not a street in the city conforms in its course to the cardinal points of the compass; the whole town standing askew—its grand plot being made of a patch-work of surveys executed at different times and apparently without object or system. In this manner many of the streets and blocks are cut by awkward angles for which there was no necessity, while a large number of the streets entering the main avenues from opposite directions strike the same at points widely separated, whereby their continuity has been destroyed—suggesting, in the miner's phrase, the occurrence of a "slide."

For this culpable neglect of system and foresight, no better excuse is to be found than the inability of the earlier settlers of the town to foresee its future greatness and the reckless indifference of those who came after, as to both its appearance and welfare.

In adjusting the street grades these grave mistakes have been further mutiplied, in an utter disregard of the topography, whereby dangerous precipices and unsightly chasms have been formed in the very heart of the town, through the costly and generally vain endeavor to reduce these natural inequalities of the surface. This system, while it has operated to the great detriment of property-holders, has in numerous instances also resulted in the permanent disfigurement of the city.

So narrow were many of the streets, which it should have been foreseen must become great thoroughfares, that it has lately been found necessary to widen several of them; while others, in consequence of a too abrupt termination, have required to be extended in order to accommodate the trade and travel of certain quarters, these prolongations causing irreparable defacement to the blocks and streets they are made to cross. In those parts of the town more recently laid out many of the above mentioned evils have been avoided. The citizens have also of late become earnestly interested in the subject of setting apart from the Pueblo lands ample reservations for school houses, parks, squares and similar purposes; therefore, it seems probable that San Francisco will in a short time be noted for the extent of its public grounds, if not for the costly style of their improvement.

The city is already the owner of sixteen squares, ranging in size from one acre, or a little more, to seventeen acres—the area of Yerba Buena, the largest of the number. The most of these squares contain four acres each, the area of the whole being 117.45 acres. Although nearly all of them are enclosed, only Portsmouth, the smallest of the number, and often called by way of distinction the "Plaza," has been improved.

The greater portion of the earth removed in excavating the streets and grading lots has been used to fill in the tide lands, of which there is a large scope lying east of and in front of the city. Many of the sand-hills have also, through the aid of the steam-paddy and a resort to temporary railroads, been removed and employed to fill in the water lots along the city front, much of the eastern section of the town, comprising some of the principal business streets, standing wholly on these made lands.

In designating the streets, the plan of naming, instead of numbering or lettering, has been adopted ; in the older parts of the town, the cognomens of early settlers having been largely used for the purpose, although our more national names, such as Washington, Franklin, Jefferson, Clay, Webster, Scott, etc., have by no means been ignored. A few of those appellations common in English and American cities, such as Broadway, Front, Market, Main streets, and the like, are also found here. The Philadelphia, or rather, perhaps, we should say, the botanical plan, of naming the streets after certain well known trees, has not obtained to any great extent, the list being confined to four or five species. In the southern part of the town, a portion of the streets running southeast from Market, the back-bone of the city, have been numbered, some of those thus designated being named as well. For some of the streets south of Mission bay, names have been selected from the several States of the Union, interspersed among which, with characteristic confusion, are the names of California counties, and a sprinkling derived from other sources.

## IMPROVEMENT OF WATER FRONT.

Originally the water along the city front was so shallow, except at a few bluff points, that large vessels could not approach within a quarter of a mile of the shore, necessitating the use of boats and lighters for receiving and landing freight and passengers. Soon, however, wharves resting on piles were built, extending sufficiently far into the bay to admit every class of craft lying along side them. Meantime the space between the outer end of these structures and high water line began to be filled in with earth, sand and rubbish carted in from the city, to which being superadded the surface wash and slum of the sewers, a mass of decomposing filth soon accumulated, which, besides offending the senses and imperiling the public health, threatened, by gradually settling outward, to fill up and destroy the harbor.

With a view to obviate these evils and arrest this danger, the plan of building a sea-wall having been determined upon, the construction of this work was commenced in 1867, and is now in progress ; the intention being to prosecute it as rapidly as the revenues derived from the wharves will admit, these having been set aside for the purpose. This sea-wall, which is eventually to extend along the entire city front, a distance of 8,446 feet, is to be formed of a rocky embankment at the bottom, with a superstructure of solid granite, and will cost, when completed, according to estimate, about two and a half million dollars.

In the southeastern part of the city, large areas of the shallow waters bordering Mission bay have, within the past few years, been filled in with solid earth, temporary bulkheads having been constructed to retain the mass in place, where necessary. Upon these new made lands many large warehouses, brick stores, and other permanent structures have been erected, some portions of them now ranking among the most thronged thoroughfares in the city.

## STYLE AND PECULIARITIES OF BUILDINGS—FEAR OF EARTHQUAKES, AND ITS EFFECTS.

The architecture of the city, for a long time exceedingly crude and eccentric, has greatly improved within the past ten years, having become universally more chaste and regular. At first the character of the buildings was not only *outré* in style, but extremely fragile and temporary, there being neither the material nor the disposition to make them more tasteful, solid, or enduring. For many years no other building material than lumber could be had except at enormous cost, while the urgent necessities of trade forbade the delay necessary for the erection of more permanent structures. The sweeping fires, however, and the fear of earthquakes, together with the gradual cheapening of more solid material, have at length, not only led to the abandonment of this light and flimsy style of building, but has caused it to be superseded by one distinguished for massiveness and endurance. In no other city in the Union are the buildings more remarkable in this respect than those erected during the last few years in the business parts of San Francisco; nor in this extreme attention to solidity and strength have ornamentation and elegance been overlooked.

Owing to a fear of earthquakes the houses in San Francisco are not built as high as in most other large cities, the greater part of them, including the leading public edifices, not exceeding three or four stories in height. There is not a brick building of any magnitude in the city having more than five stories, and, perhaps, not a dozen having more than four, exclusive of basement. Experience does not, to be sure, warrant the apprehension of grave danger or damage as likely to arise from this cause; no loss of life or serious injury to limb or property ever having happened in consequence thereof since the founding of the city. Earthquakes are, indeed, of frequent occurrence, one or more shocks being felt nearly every year. But with two or three exceptions they have been so slight as to cause no alarm—scarcely to attract more than passing attention—the majority of them not even being observed by most people. Many persons have resided in San Francisco since its earliest settlement without being once conscious of the occurrence of these phenomena; the only damage arising from which has been the throwing down of some toppling parapets, and the cracking of certain ill-constructed walls, with slight injury on one or two occasions to a few newly erected brick buildings, the whole of which was repaired at an expense of less than ten thousand dollars—a very inconsiderable sum compared with the benefits that have indirectly accrued from the fears inspired by these harmless disturbances.

## CHURCHES AND PLACES OF PUBLIC WORSHIP.

San Francisco contains forty-six churches, apportioned among the several religious denominations as follows: Baptist, Congregationalist and Jewish, 4 each; Episcopalian, 5; Methodist, 9; Presbyterian, 6; Lutheran, 2; Catholic, 10; Unitarian, 1; Universalist, 1; besides which there are a number of sects, ten or fifteen in the aggregate, who regularly worship in public halls, court rooms, and similar places. Two of these establishments belong to the people of color, both being commodious buildings and largely attended. The congregations owning them are of the Methodist Episcopal persuasion, and number among their members many persons of intelligence and wealth. Some of the church edifices of San Francisco are costly and imposing structures, the expenditure upon several, including cost of site, having exceeded $200,000. Besides these places of Christian and Jewish worship, there are two Chinese temples in the city, with a number of small chapels wherein this people pay their devotions, the temples being used only at intervals, as on New Year's day, and other religious or festive occasions. At these times all the rites and ceremonies peculiar to Budhism are carefully observed, this worship involving, after the wont of all Oriental religions, a vast display of barbaric tinsel and studied formality.

## THEATRES, AND OTHER PLACES OF AMUSEMENT.

There are eight theatres of various grades in San Francisco, one of the oldest and largest having early in 1868 been destroyed by fire. These institutions have always been well sustained, the people of California having, from the earliest settlement of the State, been liberal patrons of the drama, notwithstanding the prices of admission to these places, much less now than formerly, are more than fifty per cent. higher than in any other part of the world.

The individual receipts of these theatres range from three up to twenty thousand dollars per month. For several years past, theatrical performances, previously allowed on the Sabbath, have been prohibited by law on that day—a restriction that excites much opposition on the part of many citizens of foreign birth. Of these theatres, two belong to the Chinese—the performances being in that language, and their patrons belonging almost exclusively to that race. Besides the regular and legitimate theatres, there are many other places of recreation and amusement in San Francisco, such as melodeons, music halls, public gardens, etc.; while of beer cellars, dance houses, and other low places of resort, the number is discreditably large.

## SCIENTIFIC, SOCIAL, LITERARY, AND ELEEMOSYNARY INSTITUTIONS.

Of these various institutions, societies, and orders, San Francisco can justly boast a large number, considering the youthfulness of the city and its comparatively limited population—there being over sixty different organizations of this kind, independent of the Masonic and Odd Fellows' fraternities, both very efficient and numerous.

Among the associations devoted to the culture of scientific and philosophical pursuits, the principal are the California Academy of Natural Sciences and the German Society of Natural Sciences; the former, organized in 1853, and now numbering over eighty members. These institutions, which comprise among their members most of the leading naturalists, scientists and savans of the State, are justly entitled to the thanks of the public for their valuable and gratuitous services in behalf of the cause of science and economic industry. To their observations on the peculiarities of California meteorology, and their investigations in the various departments of natural history and philosophy, including a careful study of the geology, mineralogy, and botany of the State, our people are indebted for the utilization of many important facts, and the dissemination of much knowledge of popular interest and practical value.

Among the institutions of a purely literary, or which partake of a literary, social and industrial character, the Mercantile Library, the Mechanics' Institute, the Young Men's Christian Association, and the Society of California Pioneers, stand most prominent—each of them owning extensive and costly buildings, supplied with capacious and well stocked reading rooms, large and valuable libraries, and almost every other aid and appliance calculated to promote the objects of their organization.

The citizens of San Francisco have ever been noted for their liberal and ready responses to demands made upon them in the name of charity; hence we find the city abounding in well sustained institutions of a purely benevolent kind, foremost among which are the Protestant

Orphan Asylum, incorporated February, 1851. In 1854 a building was erected at a cost of $30,000, to which additions have since been made, involving an equal expenditure. The institution contains two hundred children, though it has accomodations for fifty more. The Roman Catholic Orphan Asylum, an equally noble charity, contains about three times the number of children that there are in the Protestant Asylum. This establishment, to which there is attached an extensive school, consists of several large and expensive buildings—the whole having cost over $100,000, independent of the valuable tract of ground on which they are situated. Among the more notable and meritorious of these associations is the Ladies' Protection and Relief Society, the San Francisco Benevolent Association, the Seamans' Friend Society, the State Industrial School, the Prisoner's Aid Society, and the City Alms House, recently founded. It may here be observed that the State extends a liberal aid to some of these institutions—large sums being given every year to the Orphan Asylums by special appropriation. For their chief support, which involves constant and heavy expenditure, however, they have to look to the voluntary services of the philanthrophic, and the contributions of the benevolent.

Besides these public charities there are a multitude of others of a more private kind, almost every nationality having at least one, and some of them several organizations designed to aid the needy and suffering of their own countrymen. Connected with several of these societies are large and well conducted hospitals for the reception and treatment of persons suffering from wounds or sickness. An extensive hospital belonging to the city is always kept full of inmates, invalids from all parts of the State making this an asylum in their extremities. The municipal authorities, however, have received all applicants without discrimination or question, notwithstanding no assistance has been rendered by the various counties, thus shifting upon the metropolis the burdens which they themselves should have borne, or should cheerfully assist in bearing; nor has the State, as it was equitably bound to do, made any provision for relieving the city of this hardship. The cost of supporting this institution is $60,000 per annum, the municipal authorities appropriating nearly $6,000 besides, for the support of a Small Pox Hospital.

The United States Marine Hospital, an extensive edifice erected some ten years ago, on a commanding eminence in the southeastern part of the city, receives over one thousand patients in the course of the year, the average number of inmates being about one hundred.

St. Mary's Hospital, a Catholic institution, has accommodations for a large number of patients, as have also the German and French establishments, situated in the southern part of the town.

In addition to the foregoing, there are many other philanthropic and charitable institutions located in and around the city, the most prominent of which are the Asylum for the Deaf, Dumb, and Blind, now at the Mission Dolores, but soon to be removed to the fine edifice erected for this unfortunate class by the State, on a handsome elevation near the city of Oakland; the Magdalen Asylum, on the San Bruno road, one mile south of the city, opened about three years ago under the auspices of the Sisters of Mercy, and now containing some sixty or seventy inmates; the Woman's Hospital, founded in the spring of 1868, by the contributions of benevolent citizens, for the temporary use of which a commodious building has been secured in the heart of the city; the Alameda Park Asylum, situated on the Encinal, Alameda, designed for the care and treatment of patients suffering from dementia, and from cerebral and nervous disorders; and, finally, not to enumerate many noble charities more quietly managed, the Home for the Inebriate, organized May, 1859, and which, after occupying temporary quarters for a number of years, has now a substantial brick building, located in the northern part of the city, purchased at a cost of $7,500. The municipal authorities appropriate $250 monthly towards the support of this institution.

## NUMBER OF INHABITANTS—DIVERSITY OF RACES, IDEAS, AND CUSTOMS—JUVENILE POPULATION.

The number of inhabitants in San Francisco at the end of March, 1868, was estimated at 133,000, including a large transient population. Many estimated it at a higher number, but the figures lately given by "Langley's City Directory" make it considerably less than the number first mentioned.

At the beginning of 1848, the city, composed of about one hundred small buildings, contained a population of 480 souls, which three years thereafter had been swollen to about 20,000. In 1860 the city contained 56,831 inhabitants, of whom 53,073 were whites, 1,142 colored, and 2,616 Chinese. At the present time these races are apportioned as follows: 116,000 whites; 2,500 colored, and 3,600 Chinese, to which may be added a transient population of ten or twelve thousand, this element always being large in San Francisco. The number of white children under fifteen years of age amounts to 34,710, of whom 20,008 are between five and fifteen years old. Seven years ago there were but 12,116 children in San Francisco under fifteen years of age, 6,890 of whom were native born.

In nationality the inhabitants are greatly diversified, being made up of almost every race under Heaven, nearly all the leading countries of Europe being largely represented. Owing to this intermixture, a strange medley of manners, customs, and languages, as well as religious ideas, are noticeable. These different customs prevail in regard to the observance of the Sabbath, and also as to the first day of the year; the Israelites consecrating the seventh, and the various Christian sects the first day of the week, while the Mongolian races fail to pay attention to any. So, also, these several sects and peoples each have a new year of their own, which none neglect to observe, this being with the Chinese an occasion for general rejoicing. On this day it is their wont to settle up all their affairs for the past year, and to discharge as far as possible all their debts and liabilities, every person desirous of maintaining a good business standing making great efforts to that end.

## EDUCATIONAL SYSTEM—PUBLIC SCHOOLS, COLLEGES, SEMINARIES, AND PRIVATE INSTITUTIONS OF LEARNING.

Of its educational system and institutions, San Francisco may justly be proud, the whole being designed upon a scale of munificence, and sustained with a liberality not elsewhere surpassed. In its public school department there were 120 teachers employed during the fiscal year ending June 30th, 1867. The expenditures of the department during that time were $209,874 75, the total receipts of the same period having been $320,807 57, all but a mere fraction of which, were disbursed for teachers' salaries, erection of buildings, rents, etc. The salaries paid teachers range from $600 to $2,500 per year. The property belonging to this department, including school houses and the grounds they occupy, vacant lots, etc., is of great value. Some of the school houses lately erected are spacious and elegant structures, being worth, with the lots on which they stand, from $100,000 to $250,000.

Besides the public school establishments, there are over seventy private educational institutions, a few of which already do, or, it is designed shall, partake of a public character. The number of students in these various places of learning aggregate something over four thousand, many of them being numerously attended, and nearly all in a flourishing condition. Twelve of the number belong to or are controlled by the Catholics, this portion containing a total of 3,400 scholars.

The largest and one of the most numerously attended of these institutions is the St. Ignatius College, on Market street, an edifice which, though constituting but one-third the building hereafter to be erected, has already cost $120,000, independent of the site it occupies. This college is under the direction of the Jesuits, there being a large number of priests of this order employed as teachers.

St. Mary's College, also a Catholic establishment, situated four miles south of the city, is a costly brick edifice, occupying spacious grounds, and attended by a large number of students.

Of the institutions not under sectarian control the most noteworthy is the City College, in which the course of studies, besides the classical and other higher branches, embraces many of a more utilitarian kind —there being an extensive and well appointed chemical laboratory attached to the school in which the pupils are fitted for practical metallurgists, assayers, miners, etc. The University School, Union College, and several other similar establishments, all occupy a high rank as preparatory schools, several of them being empowered to issue diplomas, conferring the titles usually bestowed by the higher institutions of learning.

Among the noted institutions of the city of a more thoroughly utilitarian character than any yet mentioned, is the California Business University, an establishment designed to qualify young men for active business pursuits of every description, they being trained and practically exercised in all the laws of trade and commerce by actual transactions. This school, under the management of Professor E. P. Heald, a teacher of long standing in the city, has been eminently successful and popular, numbering among its patrons many of the foremost men in our commercial and financial circles, by whom it is understood to be held in high estimation. A large number of young men now holding lucrative and responsible positions in our leading banking and mercantile houses, received their early training at this institution.

There are also a number of seminaries and high schools for the education of females, the curriculum of which embraces studies of a practical character, the knowledge imparted being of a solid and useful rather than of a superficial and showy kind.

Several of the religious sects, as the Israelites and Catholics, have schools of their own; some of these, belonging to the latter denomination, containing from five to nine hundred scholars each.

San Francisco is well provided with libraries, the principal of which consists of the following, viz: The Mercantile Library Association, 25,000 volumes; Odd Fellows, 17,000 volumes; Mechanics' Institute, 11,000 volumes; Young Men's Christian Association, 4,500 volumes;

Verein, 4,000 volumes; What Cheer House, 5,000 volumes; Society of California Pioneers, 3,000 volumes; Public School, 3,000 volumes; Bancroft's Pacific Library, containing over 1,000 works relating to the Pacific Coast of North America; besides which there are libraries of considerable size belonging to the several literary, scientific and law associations of the city.

## VALUE OF CITY PROPERTY—MUNICIPAL INCOME, DEBT AND EXPENDITURES—BUILDINGS, IMPROVEMENTS, ETC.

The assessed valuation of property in the city for 1867 amounted to $96,700,397, of which $53,485,421 consisted of real and $43,214,976 of personal property. The revenue accruing for the fiscal year ending June 30, 1867, amounted to $1,841,753 96, of which $987,105 77 went to the State. The municipal debt reaches at the present time the sum of $4,748,677.

The municipal expenditures for the last fiscal year were as follows:

| | |
|---|---|
| Current expenses | $939,285 05 |
| Permanent improvements | 188,073 75 |
| Interest | 213,353 06 |
| Reduction of debt | 354,686 82 |
| Old claims | 71,166 66 |
| Total | $1,766,565 34 |

The expenditures on the streets and highways amounted during the year 1867 to $1,009,883 85. The total amount expended on permanent improvements in the city was nearly $8,500,000. This relates to every class of improvements, such as private buildings, school houses, churches, factories, railroads, docks, wharves, etc. The number of buildings erected in 1867 was, according to Langley's City Directory, recently published, 1,050—350 being brick. The present number of buildings in the city is, on the same authority, 17,368—of which 13,511 are constructed of wood.

The principal buildings completed during the year 1867 consist of the Bank of California, the Merchants' Exchange, the Mercantile Library Buildings, the Mechanic's Institute, the Lick House extension, Fireman's Fund Insurance, Hayward's, and the Pacific Insurance Company's building, all very costly and elegant structures, besides many large and costly blocks and stores in different parts of the city.

Many extensive and costly improvements have been made within the past year or two in the construction of wharves and docks. The principal of these consists of the Dry Dock at Hunter's Point, commenced September, 1866, and to be completed by the end of 1868. This dock is to be 465 feet long and 125 feet wide, having sufficient depth to float in vessels drawing 22 feet of water. Though excavated for the most part out of solid rock, the front is to be covered with heavy blocks of cut granite. It is to be supplied with powerful engines, pumps and every appliance for securing the greatest efficiency, and will have cost when completed over $1,200,000.

The Merchants' Dry Dock Company have lately finished a similar, but smaller work, at a cost of about $60,000. The apparatus here is capable of sustaining vessels of 1,000 tons burden. The Union Lumber Association are now constructing a dock of considerable capacity near Beale street, at a prospective cost of about $150,000. The improvements made during the past two years by the Pacific Mail Steamship Company, in filling in a large area on the northeastern shore of Mission Bay, rank among the most important of the kind yet effected in or around the city; 300,000 cubic yards of earth have been used for making new ground; the wharves on which the Company's new sheds and store houses are located, having required 1,200 piles and 3,000,000 feet of sawed lumber in their construction.

## POLICE AND FIRE DEPARTMENTS.

The police force of the city is composed of one chief, and one hundred men—the latter at an annual salary of $1,500 each; and four captains, with a salary of $1,800 each ; besides which, there are a number of officers deputized for duty in different parts of the city, to look after private property, the owners of which pay them for their services.

In December, 1866, San Francisco abolished the volunteer, and adopted the system of a paid Fire Department. This organization is one of the best appointed, as it has always been one of the most efficient anywhere to be found. The working force consists of one hundred and fifty-six members, officers and men included. Belonging to the department are six steam engines with accompanying apparatus, two more having recently been ordered from the east, whence all have been imported. There are 493 hydrants and 50 cisterns in various parts of the city, the latter capable of holding 1,480,000 gallons of water. The sum of $112,000 is appropriated annually for the support of the department, including purchase of engines, etc. A fire alarm telegraph has also been introduced—the construction and fitting up of which cost $20,000.

## CEMETERIES, PUBLIC GARDENS, AND HOMESTEAD ASSOCIATIONS. —CITY RAILROADS.

The principal cemeteries in the vicinity of the city are Lone Mountain and Calvary, both very extensive, the former being beautifully adorned and handsomely laid out. There are here many elegant tombs and monuments, the site of both these cemeteries being extremely fine, commanding an extensive view of the city, bay, the surrounding country and the ocean—the latter being but two or three miles distant. There are also six other cemeteries in the neighborhood of the city, belonging to the Masons, Odd Fellows, Israelites, etc.

The only public gardens calling for special notice are Woodward's and the City Gardens, in the southern part of the town, and embracing some eight or ten acres of land each, all handsomely laid out and improved. At these spots a great many birds, animals and natural curiosities, have been collected, which, with the ample means provided for recreation and amusement, render them favorite places of resort.

There are over thirty Homestead Associations owning lands in and around the city—this method of acquiring lots being greatly in favor here.

There are seven city railroads within the limits of the town, the whole embracing a linear extent of nearly thirty miles. They are all operated by horse power, no locomotives being allowed to enter the densely populated portions of the city. Besides these local roads, the San José railroad enters the city from the south; while connections are made, by means of steam ferries, with several roads on the east side of the bay.

The following receipts of the principal city railroads for the month of February, 1868, fairly exhibit their average earnings throughout the year: Omnibus, $21,693; North Beach and Mission, $10,575; Central, $11,820; Front street, Mission and Ocean, $7,086; Market street, $5,909.

## GAS WORKS AND WATER WORKS—MARKETS.

The San Francisco Gas Company, organized in 1852, is the only one of the kind in San Francisco, furnishing all the gas consumed by the inhabitants. This company have a capital stock of $6,000,000, which has always been sought after, both at home and abroad, as a safe and profitable investment.

Almost the entire supply of water for San Francisco is furnished by the Spring Valley Water Works Company, formed in 1865, by a consolidation of a company bearing the same name with the San Francisco Water Company, and having a present capital stock of $6,000,000, divided into 60,000 shares of $100 each. The sources of supply consist of Pillarcitos and Lobos creeks, having capacity to furnish much more than the present wants of the city require. This water is of excellent quality, being taken from pure mountain streams in the Coast Range, south of San Francisco. The company's reservoirs are capable of holding enough water to serve the city for many months in an emergency. The length of pipe laid down within the limits of the city proper extend a distance of seventy-eight miles.

While there are several large public markets, with a multitude of smaller ones in different parts of the town, the principal establishment of this kind is the California and Pine street Market, built in the summer of 1867, at a cost of $200,000. It is capacious, well arranged, and admirably adapted to the purposes for which it was designed, being open and of easy approach on every side, and centrally located with reference to population.

## BANKING INSTITUTIONS AND INSURANCE COMPANIES.

At the head of the fiscal institutions on this coast stands the Bank of California, organized in July, 1864, under the laws of this State, with a capital of $2,000,000, since increased to $5,000,000, on which it pays regular monthly dividends of one per cent., being understood to have large reserves. Its list of stockholders and officers includes many of our leading business men and capitalists, and its broad and liberal financial policy, leading to a large and rapidly expanding business, has already given it a commanding influence both at home and abroad.

The Pacific Bank, also incorporated under the laws of California, has been in operation for several years, having meantime disbursed to stockholders one per cent. monthly dividends on its paid up capital. There are several branches of foreign banks located in San Francisco, the home institutions they represent having an aggregate capital of $7,000,000.

Besides these regularly incorporated establishments, there are thirteen unincorporated banking houses in the city, having a total capital of about $5,000,000. The funds held by private capitalists, for purposes of temporary loans, exceed $10,000,000, while the deposits in the several Savings Banks reach the sum of $15,000,000, making a total of about $41,000,000 employed for loan purposes. There are seven Savings and Loan Institutions in the city, two or three of which are doing an immense business, while all are in a prosperous condition, with a rapidly growing patronage; the sums deposited in these places being larger in San Francisco, population considered, than in any other city in the world.

There are ten home Insurance companies in San Francisco, with an aggregate capital of about $6,000,000, and thirty-five agencies or branches of foreign companies doing business in the city. Their operations extend to every class of insurance, and their profits, notwithstanding a sharp competition, have heretofore been large.

## UNITED STATES BRANCH MINT.

At this establishment, located in San Francisco, is made two-thirds of all the coin manufactured in the United States. One hundred men and three coining presses are kept constantly busy, $242,000,000 having been coined here between 1854, the year of its establishment, and 1867, inclusive—an amount nearly equal to one-half the entire coinage of the Philadelphia Mint since its origin in 1793. The business of this institution having, however, outgrown its narrow accommodations, the Government has purchased a suitable site for a new establishment on the corner of Mission and Fifth streets. For this central and every way suitable location the sum of $100,000 was paid, much less than its actual value at present, and thereon will soon be erected a mint on a scale to meet the requirements of the Pacific coast for many years to come.

The law allows one-fifth of one per cent. for wastage on the amount of bullion manipulated. How close this establishment has been able to work of late years, will appear from the reports of the Superintendent for the years 1865 and 1866:

The whole amount of gold bullion delivered to the coiner, during the year 1865, was 2,038,211 ounces, valued at $37,920,213 31; the whole amount returned by him during same period was 2,038,106 ounces, valued at $37,918,257; showing a discrepancy of 105 ounces, equivalent to $1,956.

The above discrepancy of one hundred and five ounces, worth less than $2,000, is the amount of actual wastage, or the gold lost in manipulating nearly $38,000,000—only three and a half per cent. of the legal limit.

The whole amount of silver bullion delivered to the coiner during the same period was 563,233.74 ounces, valued at $655,399 26; the amount returned by him was 563,223.46 ounces, valued at $655,387 30; difference, 10.23 ounces, valued at $11 96.

The actual loss in the manipulation of over $600,000 worth of silver bullion being $11 96. The legal limit of silver wastage is "two thousandths of the whole amount," which would be $1,310 79. The coiner's actual loss was, consequently, but nine-tenths of one per cent. of the legal limit. The statement of the melter and refiner exhibits a corresponding nicety of manipulation and diminution of loss—the more remarkable as the operations of melting and refining involve a greater degree of wastage than coinage.

The whole amount of gold bullion delivered to this official, during the year 1865, was 1,834,524 ounces, valued at $34,130,683. The amount returned by him, was 1,834,371 ounces, valued at $34,127,849; showing a difference of 152 ounces; loss, $2,833 68. The law allows the melter and refiner a wastage of "two thousandths of the whole amount of gold and silver bullion" received, which would be over $68,000. The actual loss was but four and one eighth per cent. of that amount—$65,000 less than the limit allowed by law.

The whole amount of silver bullion delivered to him, was 821,704.21 ounces, valued at $956,164 91; the amount returned, was 826,035.23 ounces, valued at $961,204 62; the results obtained having been even more favorable than those attending the melting and refining of the gold. The exhibit for 1866 did not differ essentially in the results obtained from that of 1865, only the quantity of bullion coined was some $7,000,000 less.

Of these metals coined at the Branch Mint since its opening in 1854 to the close of 1867, $236,224,656 81 were gold, and $5,861,957 17 silver. The number of pieces coined amounted to 23,057,233, of which 10,832,651 were double eagles; 335,326 were eagles; 429,308 were half eagles; 62,100 were three dollar pieces; 314,502 were quarter eagles, and 87,502 were dollar pieces.

The San Francisco Branch Mint derives its crude deposits from the several States and Territories west of the Rocky Mountains. Since 1864 the Denver Mint has absorbed much of the Colorado product—about one million during three years—and has taken some from Montana, although not equal to the amount received during the same period by the San Francisco institution. The following are the approximate figures of the bullion received at the Branch Mint, from various localities, since 1854, up to and including the year 1867: From California, $201,411,644 73, besides silver partings, $3,140,259 78; from Colorado Territory, during 1862–63, (none since), $60,152; from the State of Nevada, $121,824 37, (the most of the bullion from that State, which consist of silver, being sent off in bars); from Dacotah, $5,760, (received in 1863); from Washington Territory, $35,132 94; from Idaho, beginning in 1864, $9,657,881 84; from Arizona, beginning in 1865, $74,237 67; and from Montana, beginning in 1865, $1,129,131 12.

In 1854, all of the chemicals, acids, alloys, and other supplies used in refining, parting and curing, were shipped from the East. Now, with the exception of delicate machinery—sent from the parent Mint in Philadelphia, or imported from Europe,—the supplies are drawn from indigenous sources. A San Francisco manufacturing company furnishes the acids; borax and the other articles of necessary consumption being also of home production, and furnished at prices lower than the imported article. The Mint is characteristically Californian—is self-supporting, although its revenue is confined to a coinage of one-half of one per cent., and the charge for "parting" gold and silver—which, in the language of the Mint Law,—"shall be equal to, but not exceed the actual cost of the operation, including labor, wastage, use of machinery and materials," etc. This charge, at the recommendation of the present Superintendent, R. B. Swain, was recently reduced from fourteen to eleven cents. Among the many other improvements due to this officer, is the increase of the Bullion Fund, by which depositors are enabled to receive the value of their bullion immediately after the assay is determined.

The value of Mint charges are as follows: On bullion, under 300 parts gold, 3 cts. per ounce; finer, 300½ to 600 gold, 5 cts. per ounce; finer, 600½ to 750 gold, 7 cents per ounce; finer, 750½ to 945½ gold, 11 cts. per ounce; finer, 950 and above, no charge.

The present executive officers of this institution are: Superintendent, Robert B. Swain; Treasurer, D. W. Cheesman; Melter and Refiner, J. M. Eckfeldt; Assayer, B. T. Martin; Coiner, William Schmolz. With the exception of the office of Melter and Refiner, made vacant by the death of Walter S. Denio, and filled by his assistant, Mr. Eckfeldt, there have been no changes in these officials since 1863. From the well known San Francisco merchant who stands at the head of the establishment, to his subordinates, the officers seem to have enjoyed—as they have doubtless deserved—the fullest confidence of the Federal Government and the business community.

## ADVANTAGES OF POSITION—FOREIGN COMMERCE AND DOMESTIC TRADE—BULLION PRODUCTS—PASSENGER ARRIVALS.

Before remarking on the trade and commerce of San Francisco, its singularly fortunate geographical position will excuse a brief allusion to its advantages in this respect, all of which become strikingly obvious, if we but glance at the map of the north Pacific and the countries adjacent to it. The natural advantages of this port, growing out of its situation and surroundings, point to it as the inevitable entrépot of the eastern Asiatic, Japanese, Australasian, and north Pacific traffic, as well as the necessary receptacle of the whole coastwise and inland trade of the western slope of the continent. For the greater portion of the latter, it is already the depot and principal port of supply, though not yet in railroad connection with more than a few of the localities consuming largely in the distant interior. It seems to have been the intention of nature that a truly metropolitan city should grow up on the shores of this magnificent bay. Hence, centrality of position, good depth of water, generous proportions, and ample protection, have been duly attended to. Standing half way between the great bights that cut the continent almost in two, and the Arctic regions where it finds an end ; at the outlet of two great rivers which serve as communicating channels with and give drainage to an imperial realm; with other navigable streams and bays connecting, affording further facilities for inland traffic; standing on the shores of an outlying ocean, furnishing highways for easy intercourse with all parts of the world; with a climate so genial that none ever complain of heat or cold; so healthful that endemic disease is wholly unknown, and, withal, so energizing that the human system retains its vigor in an unwonted degree; receiving the ice, furs, and fishing products of the frozen north; the gold, grain, and mineral wealth of the vast countries that back it on the east, and the tropical fruits sent from the south, it seems destined to become, at no remote period, one of the great marts and manufacturing cities of the world.

What must contribute to secure this end in a marked degree, is the fact that San Francisco can have no rival on this side of the continent, or, at least, none that it need fear for a long time to come—if, indeed, it will not be impossible for any city on the coast to ever become so far a competitor as to essentially impair the force of this fact. The absence of good harbors elsewhere on the coast, and the interposition of mountain barriers at most points, cutting off communication between tide water and the interior, to say nothing of other disadvantages, would be sufficient to prevent any such rivalship ever attaining to formidable proportions. This natural superiority of San Francisco, already fortified by the construction of a few short railroads extending to points in the immediate vicinity, will be immeasurably strengthened by the completion of other and more important roads, one of which, the Central Pacific, is now being pushed forward with an energy that cannot fail to insure its speedy completion.

With the concentration here of many local, and ultimately of several trans-continental railroads, with powerful steamers traversing the ocean in every direction; with the rapid growth of vast and diversified industries, and the accumulation of values to the amount of several hundred millions, its commercial predominance would seem to be already secured.

But a few years ago California was dependent on other countries for almost its entire supply of manufactured wares, groceries, and all other staples of subsistence. With the exception of the precious metals, vegetables, fruits, and breadstuffs, it produced but few of the common necessaries of life. Its exports, with the exception of bullion, were few and unimportant. Ships leaving San Francisco were compelled to depart in ballast, there being no available exports for lading. Now all this is changed, California sending abroad a great variety of commodities, besides its gold and silver, the value of its grain shipments alone having amounted, in 1867, to $13,000,000. Besides the product of its flocks, herds, mines, and soil, it has become an exporter of many other kinds of raw material, and to some extent even of manufactured wares. The extent of its trade, both foreign and local, and the rate of its increase may be gathered from the following brief statements, exhibiting the total imports and exports, arrivals and departures, treasure movements, etc., at San Francisco, its principal maritime city.

The arrivals in that harbor from all quarters, including domestic Atlantic, domestic Pacific, and foreign ports, during the year 1867, numbered 2,677, with a capacity of 909,025 tons, being 520 arrivals, and 160,752 tons in excess of 1866, showing a large increase on the figures of any preceding year. Of these arrivals, 141,865 tons were from domestic Atlantic; 423,272 tons from domestic Pacific, and 334,447 from foreign ports, the largest increase being in the tonnage of home ports ; the augmented receipts of coal, lumber, and other coastwise products tending to swell this branch of our commerce. Of foreign arrivals, a large share is composed of steam tonnage, consisting of the regular lines that ply between San Francisco and Panama, San Juan del Sur, Victoria, and ports on the western coast of Mexico, the aggregate amounting for the year to 152,400 tons.

The arrivals from our chief points of supply indicating the course of the import trade were as follows:

| | Vessels. | Tons. | | Vessels. | Tons. |
|---|---|---|---|---|---|
| Domestic Atlantic Ports | 125 | 114,685 | Manila | 9 | 6,088 |
| Great Britain | 49 | 35,555 | Malaga | 2 | 673 |
| France | 12 | 5,719 | Rio Janeiro | 6 | 2,265 |
| Hamburg | 7 | 3,199 | Japan | 6 | 6,628 |
| Hawaiian Islands | 39 | 15,050 | Batavia | 4 | 1,632 |
| China | 28 | 37,168 | | | |

Showing a total of 290 vessels and 255,666 tons. The receipts of merchandise, *via* the Isthmus of Panama, for the years below indicated were as follows: 1863, 28,151 tons; 1864, 31,348 tons; 1865, 24,927 tons; 1866, 32,866 tons; 1867, 31,769 tons.

The amounts of money paid on freights of merchandise arriving at the port of San Francisco during the three years ending with December, 1867, were as follows :

| | 1865 | 1866 | 1867 |
|---|---|---|---|
| From Domestic Atlantic Ports | $3,266,534 | $2,537,390 | $2,992,475 |
| From Panama, per steamers | 1,886,613 | 2,250,174 | 2,144,702 |
| From Principal Foreign Ports | 1,228,355 | 1,327,417 | 1,402,874 |
| From other Foreign Ports | 392,990 | 602,541 | 400,541 |
| Total freights on cargoes | $6,774,492 | $6,717,522 | $6,940,592 |

Our exports of merchandise and commodities, being the product of California during the year 1867, show a considerable increase on those of any previous year, as appears by the annexed table :

| | 1865 | 1866 | 1867 |
|---|---|---|---|
| To New York, etc | $6,270,412 | $5,744,384 | $6,760,378 |
| To Great Britain | 1,175,658 | 2,609,262 | 8,318,642 |
| To Mexico | 2,082,704 | 1,703,201 | 1,992,862 |
| To South America | 541,538 | 381,132 | 770,509 |
| To Hawaiian Islands | 748,142 | 894,891 | 665,366 |
| To China | 1,233,272 | 1,518,178 | 1,325,336 |
| To British Columbia | 1,257,029 | 1,073,347 | 978,993 |
| To Japan | 122,061 | 123,702 | 811,063 |
| To Australia, etc | 546,808 | 2,666,455 | 62,999 |
| To Other Countries | 575,322 | 588,466 | 778,755 |
| Totals | $14,554,406 | $17,303,018 | $22,465,903 |

The value of shipments to New York, as above presented, represents both those by sailing vessels proceeding around Cape Horn, and by the Panama and Nicaragua steamers. The exports for 1867 were made up of a considerable variety of articles, of which wheat and flour, barley and oats constituted the principal items. The table appended shows the quantity and destination of grain and flour sent away during that year:

| To | FLOUR. bbls. | WHEAT. 100lb sks. | BARLEY. 100lb sks. | OATS. 100lb sks. |
|---|---|---|---|---|
| New York, etc. | 248,708 | 695,630 | 18,538 | ........ |
| Great Britain | 43,947 | 3,786,607 | 1,929 | ........ |
| China | 106,295 | 100,895 | 357 | 1,433 |
| Japan | 3,148 | 554 | 27,448 | 3,330 |
| Hawaiian Islands | 6,867 | 167 | 492 | 3,122 |
| British Columbia | J,134 | 1,829 | 7,353 | 661 |
| Mexico | 4,647 | 4 | 419 | 274 |
| Australia, etc. | 1,650 | 3,534 | 9,536 | 1,281 |
| Rio Janeiro | 17,509 | ......... | ....... | ........ |
| Other Countries | 84,404 | 70,075 | 2,160 | 681 |
| Totals | 519,309 | 4,659,285 | 68,232 | 10,782 |

The annexed table exhibits the annual and total export of merchandise and treasure from the port of San Francisco, from 1848 to 1867 inclusive:

| Years. | Merchandise. | Treasure. | Total. |
|---|---|---|---|
| 1848–50* | $2,000,000 | $66,000,000 | $68,000,000 |
| 1851 | 1,000,000 | 45,989,000 | 46,989,000 |
| 1852 | 1,500,000 | 45,779,000 | 47,279,000 |
| 1853 | 2,000,000 | 54,965,000 | 56,965,000 |
| 1854 | 2,500,000 | 52,045,633 | 54,545,633 |
| 1855 | 4,189,611 | 45,161,731 | 49,351,342 |
| 1856 | 4,270,516 | 50,697,434 | 54,967,950 |
| 1857 | 4,369,758 | 48,976,692 | 53,346,450 |
| 1858 | 4,770,163 | 47,548,026 | 52,318,189 |
| 1859 | 5,533,411 | 47,640,462 | 53,173,873 |
| 1860 | 8,532,439 | 42,325,916 | 50,858,355 |
| 1861 | 9,888,072 | 40,676,758 | 50,564,830 |
| 1862 | 10,565,294 | 42,561,761 | 53,127,055 |
| 1863 | 13,877,399 | 46,071,920 | 59,949,319 |
| 1864 | 13,371,752 | 45,707,201 | 58,978,953 |
| 1865 | 14,554,130 | 44,426,172 | 58,980,302 |
| 1866 | 17,281,848 | 44,365,668 | 61,647,516 |
| 1867 | 22,421,298 | 40,671,797 | 63,093,095 |
| Totals | $142,525,691 | $841,610,171 | $994,135,862 |

These exports include shipments to domestic Atlantic ports as well as to foreign countries. The merchandise exports for the period prior to 1855 are estimated. The same is true of the treasure exports prior to 1851. The annual average exports of merchandise since 1848 is $7,126,285, and of treasure, $43,080,508, or, combined, $50,206,703. During the six years ending with 1867, the United States Sub-Treasurer at San Francisco shipped thence $50,000,000 on Government account, making an aggregate treasure export of $891,610,170, from 1848 to 1867 inclusive.

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* Estimated.

The combined exports of treasure and merchandise during 1867, as compared with 1865 and 1866, were as follows:

| | 1865 | 1866 | 1867 |
|---|---|---|---|
| Treasure Exports.................. | $45,308,228 | $44,364,394 | $41,676,292 |
| Merchandise Exports.............. | 14,355,399 | 17,303,018 | 22,465,903 |
| Totals........................ | $59,663,627 | $61,667,412 | $64,142,195 |

The receipts of treasure of San Francisco from all sources, through regular public channels during the years 1866 and 1867, were as follows:

| | 1866 | 1867 |
|---|---|---|
| From California and Nevada........................ | $38,715,340 | $40,927,309 |
| From California, Southern Mines.................. | 5,149,749 | 4,477,461 |
| From Coastwise Ports, Oregon, etc................ | 5,940,536 | 6,192,734 |
| Imports, Foreign, British Columbia, etc........... | 2,887,028 | 3,969,322 |
| Totals...................................... | $52,692,653 | $55,566,826 |

To the above sums total should be added about ten per cent. for bullion arriving in private hands. From the foregoing table it will be seen that there was a very considerable increase in the bullion receipts of 1867 over those of the preceding year; the increase in the receipts from the northern mines, over $2,000,000, was mainly due to gains made in the State of Nevada, the product of which amounted to nearly $18,000,000 for that year.

The value and destination of treasure shipments from San Francisco, during the fourteen years ending with 1867, were as follows: To Eastern domestic ports, $428,159,455; to England, $150,548,502; to China, $55,368,810; to Panama, $7,755,344; to other ports, $9,930,338, making a total of $651,762,466.

The amount of coin transmitted to the interior by Wells, Fargo & Company's Express, during the year 1867, was $10,326,639; the amount brought by them from the interior during the same time was $5,340,184, adding $4,886,445 to interior circulation.

From the foregoing, it appears that the total receipts of uncoined treasure from the interior during the year 1867 amounted to $46,257,320, and of coined to $5,340,184, to which add foreign imports $3,968,322, and we have a total of $55,566,826 to represent the receipts at San Francisco for that year, total exports for the same period having been $41,676,292.

The army disbursements on this coast during 1867 were, on account of Quartermaster's department, 5,810,708.65; Paymaster's department, $2,288,142.85, and for Commissary department, $1,671,421.83, making a total of $9,770,272.33.

The total receipts of Internal Revenue in the State of California during the year 1867 amounted to $6,747,624.87, of which $4,021,284.25 were derived from manufactures, $1,773,326.46 from incomes, $12,460.73 from legacies, and the balance from various other sources.

The passenger arrivals by way of the sea for 1867 were 35,683, and the departure 20,419, showing a gain of over 15,000. The gain in 1866 was less than 5,000. Of the arrivals for the past year, 27,500 came by the Panama and San Juan steamers, principally from New York. The departures by the same steamers were 14,000. The arrivals from Asia during the year were 4,300, and the departure 4,500. Our gain from Australia was 1,146, from British Columbia 857, from the Hawaiian Islands 289, and from Mexico 162. The net gain to the port from all sources, by way of the sea, for the ten years ending December 31, 1867, is 115,866. Fully 75 per cent. of the passengers which have arrived at this port seawards since 1848 came from the Atlantic States.

# CHAPTER XIII.

## MISCELLANEOUS SUBJECTS.

Railroads—Central Pacific Railroad—Western Pacific Railroad—San José Railroad—Sacramento Valley Railroad—Placerville and Sacramento Valley Railroad—California Central Railroad—Yuba Railroad—Northern California Railroad—Various Short Railroads—Railroads Recently Commenced—Railroads Projected—Steamship Lines—Ship Building—Telegraphs—State and County Finances—Gold Product—Fisheries—Immigration—Population—Voters—Races, etc.—Chinese in California—Libraries—Literature, Journalism, etc.—List of California Publications.

### RAILROADS.

After a series of years of disastrous delay, during which, though numerous enterprises were planned but few were carried beyond the mere work of projection, the era of active railroad building seems about being inaugurated in California. During the session of the Legislature ending March 30th, 1868, a large number of franchises for laying down railway tracks in different parts of the State, were granted to the various companies applying for the same, the most of whom, it is supposed, will at once proceed with the work of their construction. There are now about three hundred miles of railroad completed and in operation in the State, a very small extent considering the urgent necessities as well as unexampled facilities that exist for making these improvements.

#### CENTRAL PACIFIC RAILROAD.

This, though not the first entered upon, is the longest, as it is also by far the most important piece of railway yet constructed in the State. The Central Pacific is one of the companies authorized by act of Congress to build a railroad from the Missouri river to the Pacific Ocean, designed to form a part of the road spanning the entire continent. Starting at Sacramento, it is to be pushed eastward until it meets the Union Pacific road, advancing from an opposite direction. This junction, it is supposed, will be a little to the eastward of Salt Lake, perhaps in the vicinity of Fort Bridger, 917 miles from its western terminus.

Ground on this road was first broke in the year 1863. It is now complete and in running order a distance of 105 miles, carrying it over the Sierra Nevada, the most difficult and expensive part of the route—and across which many parties, inimical to this enterprise, affected to believe it could not be built, or if built that it could not be successfully operated. The completion of this section in the most substantial manner, within a period much shorter than that originally assigned for it, and its successful operation throughout one of the most inclement winters ever known on the mountains, while it attests the energy of the company, and demonstrates the entire feasibility of the route selected, has wholly dissipated these ill founded forebodings.

The heavy and expensive work of carrying their road over the Sierra, at an altitude of 7,242 feet, and of cutting fifteen immense tunnels an aggregate distance of nearly one mile and a half through solid granite, having now been accomplished, this company will find the work of construction hereafter comparatively easy; the greater part of the route lying across a hard, dry and level country, almost entirely free from rocks, trees and other obstructions. With their present working force, over eight thousand men and one thousand mules and horses, it is calculated that they will be able during the dry season to grade the road-bed and lay down track at the rate of about two miles a day until they reach the valley of Great Salt Lake, six hundred miles east of the base of the Sierra, where the level country begins. It is believed that upwards of five hundred miles of the road will be completed by the end of 1868, and the whole distance to Salt Lake by the fall of 1870.

The business of this road has steadily increased from the time it was first opened—the gross earnings during the year 1867 having reached as high as $212,000 per month. As it is extended east, commanding the traffic of Nevada and Idaho, and ultimately of Utah and portions of Montana, its business must be largely augmented, until such time as it finally effects a junction with the Union Pacific road, establishing unbroken communication by rail across the continent, when it must at once expand into the most magnificent proportions.

Of such moment did the General Government consider the early completion of a trans-continental railroad, that it was deemed good policy to extend to the several companies undertaking this great work a liberal aid in the shape of loans, grants and franchises. To the Central Pacific Company was granted a money subsidy at the rate of $48,000 per mile on that portion of their road extending eastwardly from the western base of the Sierra, and $36,000 on the portion west of that point, together with a concession of every alternate section of public land lying within twenty miles on each side of their road, excepting only mineral lands and tracts to which pre-emption and homestead claims had legally attached. The quality of land thus secured to the company is equivalent to twelve thousand eight hundred acres for each mile of road, less the exceptions above mentioned, the timber on the reserved mineral lands being also the property of the company.

The States of California and Nevada have also dealt liberally with this corporation in granting them moneyed aid or important franchises, the former guaranteeing payment of interest at the rate of seven per cent. for twenty years on the company's bonds to the amount of $1,500,000—the city and county of San Francisco having made a free gift to them of $400,000, while several other counties through which their road runs have in like manner aided them by liberal subscriptions to their capital stock.

The immediate available assets of this company for the prosecution of their road have, therefore, been, Government bonds issued at the rates above mentioned on such portion of their work as is already finished—$1,500,000 of their bonds on which the State pays interest, and $400,000 San Francisco bonds already issued to them; their prospective means being, as the work progresses, $48,000 per mile first mortgage bonds, and United States bonds to an equal amount, making an aggregate of $96,000 per mile—almost enough, with the company's tact and prudent management, to defray the cost of grading and laying down the superstructure of their road. In lieu of these munificent gifts and subsidies, of which this company have shown themselves not undeserving, they are bound to transport troops and munitions of war, carry certain mails, and perform other service for the General Government at stipulated rates.

The following figures and data exhibt the earnings and disbursements of the Central Pacific Company during the three months ending September 30th, 1867—ninety-four miles of their road having been operated: Gross earnings, $556,509.30; operating expenses, $101,620.89; net earnings, $454,888.41.

The ratio of profits, approximating eighty-two per cent. of the gross earnings, is nearly three times as large as those realized by the best leading lines in the United States. The total income of this road for the month of September, 1867, was $200,550; operating expenses, $33,750; income for the following month, $212,000—expenses having been about the same as for September, showing a large increase of earnings over the earlier part of the year.

This company are now offering a portion of their lands, for which they have patents issued by the Government, for sale on such conditions as entitle them to the attention of immigrants and others in search of eligible places for settlement. Their possessions cover some of the finest lands in the State, whether designed for agricultural or lumbering purposes, their value being greatly enhanced by their proximity to the line of this great thoroughfare, and in many cases also to some of the best mining districts in the country.

The following are the officers of this Company: Leland Stanford, President; C. P. Huntington, Vice President; Mark Hopkins, Treasurer; E. H. Miller, Jr., Secretary; S. S. Montague, Chief Engineer; Charles Crocker, Superintendent; B. B. Crocker, Attorney. Directors: Leland Stanford, C. P. Huntington, A. P. Stanford, Mark Hopkins, E. B. Crocker, E. H. Miller, Jr., and Charles Marsh.

### WESTERN PACIFIC RAILROAD.

This company was incorporated in 1862, for building a railroad from the city of San José, *via* Stockton to Sacramento, where it is to connect with the Central Pacific road. The length of this road is 120 miles, twenty of which, leading eastwardly from San José, is already completed. The iron and rolling stock has all been purchased and landed at San Francisco; and a controlling interest in the capital stock having recently passed into more energetic hands, active operations, for some time delayed, have been resumed upon this work, with every prospect that it will be carried forward to an early completion, thereby establishing railroad communication between Sacramento and San Francisco. The principal officers of this company are the same as of the Central Pacific.

### SAN JOSE ROAD.

This railroad, extending between the cities of San Francisco and San José, a distance of fifty miles, was completed in December, 1863, since which time it has been transacting a large, profitable, and steadily increasing business.

### SACRAMENTO VALLEY ROAD.

The Sacramento valley railroad, extending from the city of Sacramento to Folsom, twenty and one half miles, was the first work of the kind completed in the State, having been opened for the transaction of business January 1st, 1856. For five or six years its earnings were large, until the construction of the Central Pacific road diverted most of the transmontane trade over that route. Since that time its receipts have been much diminished, though its local business is still considerable—more than sufficient to cover cost of repairs and operating.

### PLACERVILLE AND SACRAMENTO VALLEY RAILROAD.

This road extends from Folsom, eastwardly, to Shingle Springs, a distance of twenty-six miles, the original intention having been to carry it on to Placerville, nine miles beyond its present eastern terminus. This company being without rolling stock, their road is operated by the Sacramento Valley Company.

### CALIFORNIA CENTRAL ROAD.

This road, designed to extend from Folsom to Marysville, a distance of forty-six miles, after having been built in 1860 to the town of Lincoln, twenty-two miles northwest of Folsom, was at that point discontinued. Its earnings, owing to this abrupt termination, were never large, and the company meeting with financial embarrassments, their property has been advertised for sale, to satisfy mortgages resting upon it to the amount of $2,000,000. This road never having been supplied with cars or locomotives, the Central Pacific Company have operated it since its first opening.

### YUBA RAILROAD.

This road, intended to run from Lincoln to Marysville, a distance of twenty-four miles, was commenced in 1862, with the expectation that it would be finished the following year. Its progress, however, has since been slow, only sixteen miles, leading northwesterly from Lincoln, having yet been completed. Having recently fallen under a more energetic management, it now seems likely to be finished without further unnecessary delay.

### NORTHERN CALIFORNIA ROAD.

This railroad extends from Marysville to Oroville, twenty-nine miles. It has heretofore earned more than sufficient to defray current expenses; and should this be made a link in the projected Oregon road, it might yet prove a paying property to the stockholders. As the country about its northern terminus fills up with settlers, and the mines further back become more fully developed, its earnings will be likely, in any event, to show a steady, if not a very marked increase hereafter. The construction of the contemplated railroad up Feather river, should it be completed, would also greatly enhance the value of this property.

### VARIOUS SHORT RAILROADS.

The San Francisco and Alameda railroad commences on the bay of San Francisco, at a point opposite the city, and extends to Hayward's, sixteen and a half miles, the intention being to carry it thirteen miles further south, to Vallejo's mills, where it is to intersect the Western Pacific road.

The Suscol and Calistoga Railroad, now completed with cars running to St. Helena, a distance of twenty-two miles, is being actively pushed towards its termination, with a prospect of being completed early in the summer of 1868—its entire length being forty miles.

The San Francisco and Oakland Railroad reaches from the western terminus of the Oakland Encinal to the town of San Antonio, Alameda county, a distance of five miles, it being the intention of the company owning it to prolong it southward till it intersects the San Francisco and Alameda road.

The Pittsburg Mining Company have a railroad completed, extending from their coal mine, on Monte Diablo, to their wharf on Suisun bay, a distance of five and a half miles. It was constructed at a heavy cost, and over it all the coal from the Pittsburg, Independent, Union, and Eureka mines, is transported to tide water.

### RAILROADS RECENTLY COMMENCED.

At the head of this category we have the California and Pacific road, connecting Vallejo and Sacramento, with a branch to Marysville. This company, after much delay, having surmounted all obstacles, is now proceeding with the work of grading and laying down track with an energy and an amplitude of means that leaves its early completion no longer problematic. A considerable portion of the grading is already done, and a large amount of the rails, with a portion of the rolling stock, has reached Vallejo from the East. This road passes nearly its entire length through a rich agricultural country, and having received substantial aid from several of the counties along its route, will be likely to prove remunerative to its stockholders, as well as highly beneficial to the region it penetrates. The town of Vallejo will be especially benefitted by its construction, as it will be likely to make it the storehouse and shipping point for immense quantities of grain and other farming produce, which will find at this place their most convenient depot. In fact, Vallejo promises to become in a short time one of the important railroad centers of the State, as there is a likelihood of not less than five or six roads emanating from this town to various points in the interior. The principal of these roads likely to be soon constructed consists of one to Healdsburg, thence to be extended north through Mendocino and Humboldt counties; one to Martinez, connecting with the Western Pacific and other roads leading to different parts of Contra Costa county; one to Petaluma, and perhaps several others of minor importance projected to adjacent towns and business centers.

### ROADS PROJECTED.

Of the railroads projected, and the constructing of which is likely soon to be actively entered upon and ultimately completed, being partially or wholly located within the limits of the State, the following are the principal, viz: the Southern Pacific, entering the State from the southeast, and terminating at San Francisco, with, perhaps, a branch to San Diego; the several roads already enumerated as likely to radiate from Vallejo; the San José and Gilroy road, thirty miles long, which will undoubtedly be completed in the fall of 1868; a road from Alviso to San José, a distance of eight miles, easily built and much needed; from San Pedro to Los Angeles, twenty-five miles, the company organized, with capital stock of $500,000, and about commencing the work of grading; and the Stockton and Copperopolis road, the company also organized and likely to initiate work before long.

In addition to these roads, which are certain to be soon begun, there are a number of others in contemplation, such as a road from Gilroy to Watsonville, continued thence to Santa Cruz; from Salinas to Monterey; from Oroville across the Sierra, by way of the north fork of Feather river; and, finally, from California to Oregon—an association of heavy capitalists having, in the early part of 1868, purchased and consolidated the several roads extending from Roseville, Placer county, to Oroville, Yuba county, with a view to continuing the same north to the dividing line between Oregon and California, and extending branches into the former State. The entire length of this road, in California, will be 313 miles; capital stock, $15,000,000, in 150,000 shares, of $100 each; C. Temple Emmet, Thomas Bell, William E. Barron, Joseph Barron, and Alpheus Bull, are appointed to act as Trustees until others are duly elected.

### STEAMSHIP LINES.

From the port of San Francisco there issue three ocean steamship routes to foreign countries, there being more than double that number of important coastwise routes. The Pacific Mail Steamship Company dispatch steamers regularly four times a month to Panama, and monthly to China. The California, Oregon, and Mexico Steamship Company dispatch a vessel monthly to the following ports on the coast of Mexico, viz: Cape St. Lucas, Mazatlan, Guaymas, and La Paz; also, tri-monthly to Portland, Oregon; bi-monthly to Trinidad, Crescent City, and Umpqua river; monthly to Victoria, Alaska, and Sandwich Islands; tri-monthly to Santa Barbara, San Pedro, and San Diego, and weekly to Santa Cruz, Monterey, and San Luis Obispo. The North American Steamship Company send a steamer bi-monthly to San Juan del Sur, Nicaragua, touching at Manzanillo, the steamers of this company sometimes sailing alternately to San Juan and Panama.

According to a recent report made to the Pacific Mail Steamship Company by the President thereof, this company have assets valued at $28,000,000. They are the owners of a large number of first class ocean going steamers, it having been their policy to sell off their older and inferior vessels, and build others of greater speed, strength, and capacity—twelve of this description, together with two large propellers and a powerful steam-tug, having been constructed by them during a little more than six years following May 1st, 1861. The expensive line to China and Japan, inaugurated January 1st, 1867, is understood to be yielding the company fair returns, in view of the profitable trade they are building up for the future. The steamers employed on this route are of the largest and staunchest kind ever built, being a credit to our naval architecture and the country they represent.

What promises to be of special benefit to this service, is the probability that petroleum will soon be substituted for coal as a steam generating fuel, whereby much of the space now required for that article can be devoted to the carriage of additional cargo, while the expense for this item will be materially reduced. Should this substitution be successfully effected, the gains to this company would be immense, as the great length of the voyage—there being no coaling station on the route—compels the allotment of nearly half the ship's carrying capacity for fuel stores alone, thereby diminishing her earnings in a like ratio, since it is upon the freights that most reliance is made for profits. Petroleum can probably be supplied in California as cheaply as in any other country, when there shall be a large home consumption created for this article, warranting capital embarking extensively in its manufacture. The crude material, of the best quality for the purpose above indicated, exists at various points in the State in the greatest profusion, and under circumstances rendering the supply certain and its collection inexpensive. The prospect of our extensive petroleum deposits being used as a steam producing fuel, imparts to them a new and peculiar value.

The California Steam Navigation Company own nearly all the vessels running on the routes into the interior. In their service steamers leave San Francisco daily for Sacramento and Stockton, where they connect with smaller vessels running to points still further inland. Small steamers also run daily from San Francisco to Suisun, Benicia, Martinez, Mare Island, Napa, Petaluma, San Rafael, Alviso, and other points about the bay, there being steam ferries that constantly ply between the metropolis and Oakland, Alameda, and other towns situated on the opposite shore of the bay.

## SHIP BUILDING.

Notwithstanding the high prices of labor and certain classes of material there has been a good deal of ship building carried on at San Francisco, and at various points along the northern coast during the past six or eight years, the amount of repairing done at the port of San Francisco having always been large. For the past three years the business of constructing new vessels has been slack here as well as in all other parts of the United States. But it is believed it will soon experience a revival, the demand for new vessels being considerable on this coast, while the advantages enjoyed here in the matter of cheap lumber and certain other requisite material, will be likely to more than off-set the somewhat higher prices of capital and labor.

From a report lately made by C. T. Hopkins and Joseph Ringot to the Board of Marine Underwriters of San Francisco, it appears that there are owned in that city 136 vessels, having a total capacity of 53,312 tons, and of the aggregate market value of $1,679,000. Of this number, 21 are ships of the average age of 20 years, 76 are barks of the average age of 15 7-10th years, and 39 are brigs of the average age of 11 1-5th years.

From the same report it appears that there have been built on this coast, since 1859, twenty eight vessels, the capacity of which has ranged from 83 to 298 tons; costing from $9,000 to $25,000 each. The most of these vessels were built at San Francisco and Coos Bay, one at Oakland, and the balance at Novarro river, Umpqua, and various other points along the northern coast; the lumber used being chiefly pine, with a little teak, oak, laurel and cedar. A much greater proportion of small craft, ranging in burden from ten up to seventy or eighty tons, is built in California than of larger vessels. The keels for a considerable number of ferry boats and steamers for navigating the inland waters of the State are laid every year at San Francisco or other places about the bay, or along the navigable streams of the interior; all this class of vessels, with a few ocean going steamers, having been built in the country. Some idea of the extent of this branch of ship building may be gained from the fact that the California Steam Navigation Company have retired over one hundred steamers within the past ten years, being vessels owned by rival companies which they have bought and tied up, or hired to lie idle.

No country in the world offers anything like the natural advantages for ship building that are to be found along the northern coast of California and the southern coast of Oregon, along the Columbia river, and more especially about Puget Sound, timber of good quality and of the most desirable size being everywhere abundant and convenient to deep water. So decided are these advantages, taken in connection with the superior climate, admitting of labor being prosecuted the year through without interruption, that the authors of the report alluded to suggest to the Board of Underwriters, the policy of the shipping and insurance interest on the coast aiding practical builders in establishing an extensive ship yard at some eligible point, or perhaps several, with a view to building vessels not only for home service, but for sale in foreign markets; satisfied that, if embarked in on a large scale and sustained by ample capital, the enterprise could not fail to prove highly remunerative to parties concerned and extremely beneficial to the public.

## TELEGRAPH SYSTEM.

The Telegraph system of this coast was inaugurated by the organization in September, 1862, of the California State Telegraph Company. Its lines originally extended from San Francisco to Marysville, there being then but three other offices opened, viz: at San José, Stockton and Sacramento. Now the Company own over five thousand miles of wire and nearly two hundred offices, while their lines extend to all the important points in this State, Washington Territory, British Columbia and Nevada, and as far east as Great Salt Lake City. It consolidated in 1860 with the Alta California Telegraph Company, reaching eastward to Sonora and Downieville, and in 1861 with the telegraph lines in Oregon, and with those of the Pacific and Atlantic Telegraph Company, then completed from San Francisco to Los Angeles. In 1861 the Overland line to the Atlantic was inaugurated, with the aid of subsidies from the Federal and State governments. It was commenced in April, 1861, and finished on the 25th day of October of that year to

Salt Lake, there connecting with the Western Union Telegraph Company. In 1862 the Overland Company was consolidated with the State Company, and in 1867 the entire lines of the latter were leased by the Western Union Telegraph Company, which, with this addition, is said to have more than one hundred thousand miles of wire. In fact, the history of telegraphing on this coast, as everywhere else, is only a series of unions, showing seemingly a constant tendency in short, isolated lines, to merge into and disappear before extensive and united systems.

## GOLD PRODUCT OF CALIFORNIA.

The following table exhibits the total and annual product of gold in the State of California, from the time of its discovery to the end of 1867, a period of twenty years. The figures, though not perhaps absolutely correct, approximate exactness as nearly, no doubt, as any estimates extant:

| | |
|---|---|
| 1848 | $10,000,000 |
| 1849 | 40,000,000 |
| 1850 | 50,000,000 |
| 1851 | 55,000,000 |
| 1852 | 60,000,000 |
| 1853 | 65,000,000 |
| 1854 | 60,000,000 |
| 1855 | 55,000,000 |
| 1856 | 55,000,000 |
| 1857 | 55,000,000 |
| 1858 | 50,000,000 |
| Carried forward | $555,000,000 |
| Brought forward | $555,000,000 |
| 1859 | 50,000,000 |
| 1860 | 45,000,000 |
| 1861 | 40,000,000 |
| 1862 | 34,700,000 |
| 1863 | 30,000,000 |
| 1864 | 26,600,000 |
| 1865 | 28,500,000 |
| 1866 | 26,500,000 |
| 1867 | 25,000,000 |
| Total | $861,300,000 |

## STATE AND COUNTY FINANCES.

From the last report of the State Controller, it appears that the total indebtedness of the State of California amounted, on the 1st November, 1867, to $5,126,500, which has since been reduced to a little less than $4,700,000. The State revenues for the fiscal year ending June 30th, 1867, amounted to $3,595,232.06, the expenditures for the same period having been $2,954,233.79. The total receipts of the State for 1868 were estimated by this official at $2,394,440, and the expenditures at $2,246,630.

The following table exhibits the amount of indebtedness, rate of interest, assessed value of property, rate of taxation, and estimated population in all the counties in the State, with the few exceptions apparent therein.

| Counties. | County Debts. | Amount Funded. | Rate of Interest ℔ Cent. | Amount per cent. Taxes levied for county purposes. | Assessed Value of Real Property—1867. | Assessed Value of Personal Property—1867. | Estimated Population, exclusive of Indians and Chinese. |
|---|---|---|---|---|---|---|---|
| Trinity | $70,000 00 | ........ | 10 | $4.80 | $239,994 | $373,407 | 2,200 |
| Amador | 99,152 10 | ........ | 10 | 1.90 | 1,157,697 | 889,246 | 11,000 |
| Nevada | 22,033 00 | ........ | 10 | .62 | 2,619,480 | 2,227,807 | 16,560 |
| Alameda | 34,000 00 | ........ | 10 | 1.07 | 4,813,295 | 1,856,705 | 15,430 |
| Tuolumne | 515,292 91 | $34,300 00 | 10 | 3.67 | 642,055 | 678,450 | 14,000 |
| Shasta | 52,799 00 | ........ | 10 | .60 | 372,915 | 651,867 | 5,986 |
| Yolo | 49,371 76 | ........ | 10 | 1.35 | 794,991 | 1,305,617 | 7,080 |
| Sierra | 50,695 00 | ........ | 10 | 1.80 | 628,962 | 1,010,134 | 7,000 |
| Colusa | 34,000 00 | ........ | 10 | .55 | 780,199 | 1,297,412 | 3,600 |
| San Francisco | 4,768,061 00 | 4,768,031 00 | 6 7 10 | 1.97 | 57,882,113 | 51,152,614 | 125,000 |
| Merced | 15,000 00 | ........ | ........ | 2.00 | 359,987 | 884,885 | 1,800 |
| Calaveras | 206,240 00 | 191,240 00 | 8 10 | 4.00 | 786,546 | 586,950 | 10,732 |
| Siskiyou | 61,618 10 | 61,618 10 | 10 | 1.27 | 468,350 | 1,110,185 | 6,000 |
| Fresno | 19,438 00 | 15,500 00 | 10 | 1.67 | 245,716 | 963,882 | 3,000 |
| Santa Cruz | 30,000 00 | 20,000 00 | 10 | 1.70 | ........ | *1,441,739 | 6,500 |
| El Dorado | 262,715 14 | 187,573 04 | 10 | ........ | 1,391,213 | 1,540,725 | 16,000 |
| Napa | 175,000 00 | 149,500 00 | 10 | 2.05 | 2,252,134 | 1,075,138 | 6,000 |
| Stanislaus | 28,243 98 | ........ | ........ | 1.74 | 551,257 | 699,132 | 2,500 |
| Sutter | 5,595 90 | ........ | ........ | 1.37 | 368,854 | 1,363,172 | 5,100 |
| Marin | ........ | ........ | ........ | 1.37 | 1,529,964 | 709,109 | 5,000 |
| Contra Costa | 41,000 00 | 32,000 00 | 10 | 1.66 | 1,671,837 | 1,002,126 | 8,000 |
| Monterey | 20,000 00 | 20,000 00 | ........ | ........ | 739,068 | 671,509 | 5,000 |
| San Mateo | ........ | ........ | ........ | .87 | ........ | *2,700,000 | 5,148 |
| Los Angeles | 177,000 00 | 160,850 00 | 7 | 2.37 | 1,257,942 | 1,298,141 | 12,000 |
| Santa Clara | 466,500 00 | ........ | 7 12 | 1.47 | 6,268,703 | 2,983,569 | 30,000 |
| Sacramento | 702,560 24 | 412,300 00 | 6 | 1.50 | 4,974,329 | 4,499,870 | 23,000 |
| Placer | 253,340 00 | 253,340 00 | 8 | 1.12 | 2,808,769 | 1,296,619 | 12,000 |
| Mendocino | 55,612 53 | 39,263 64 | 10 | 1.82 | 650,306 | 1,460,584 | 6,200 |
| Del Norte | 12,000 00 | 4,200 00 | 10 | 1.02 | 65,260 | 349,868 | 1,500 |
| Klamath | 22,655 47 | 13,652 19 | 10 | 1.87 | ........ | *341,187 | 600 |
| Alpine | 10,000 00 | 10,000 00 | 6 | ........ | ........ | *450,000 | ........ |
| Butte | 277,513 00 | 200,000 00 | 10 | ........ | ........ | *5,128,358 | 9,350 |
| Humboldt | 20,000 00 | ........ | ........ | ........ | ........ | *2,200,000 | 5,330 |
| Inyo | ........ | ........ | ........ | ........ | ........ | *500,000 | ........ |
| Kern | 3,000 00 | ........ | ........ | ........ | ........ | *819,825 | ........ |
| Lake | ........ | ........ | ........ | ........ | ........ | *395,708 | 3,350 |
| Lassen | 16,300 00 | ........ | ........ | ........ | ........ | *750,000 | 1,420 |
| Mariposa | 47,759 00 | 5,050 00 | 10 | ........ | ........ | *1,237,470 | 4,170 |
| Mono | 15,000 00 | ........ | 10 | 1.60 | 127,085 | 132,580 | 700 |
| Plumas | 8,000 00 | ........ | ........ | ........ | ........ | *1,192,521 | 3,670 |
| San Bernardino | 21,007 00 | 14,024 00 | 7 | ........ | ........ | *695,201 | 5,260 |
| San Diego | 90,255 14 | 32,714 45 | 10 | 1.35 | ........ | *585,383 | 1,500 |
| San Joaquin | 96,868 00 | 45,000 00 | 7 8 10 | ........ | ........ | *5,275,016 | 17,140 |
| San Luis Obispo | 36,800 00 | 36,800 00 | 10 | ........ | ........ | *758,330 | 2,850 |
| Santa Barbara | 40,000 00 | 40,000 00 | 7 | ........ | ........ | *771,361 | 5,470 |
| Solano | 149,834 00 | 96,252 00 | 7 10 | ........ | ........ | *3,044,120 | 15,850 |
| Sonoma | ........ | 16,500 00 | 10 | ........ | ........ | *5,346,686 | 25,280 |
| Tehama | 100,000 00 | 100,000 00 | 10 | ........ | ........ | *1,598,500 | 3,386 |
| Tulare | 52,000 00 | 52,000 00 | 10 | ........ | ........ | *1,299,379 | 4,890 |
| Yuba | 187,400 00 | 183,400 00 | 10 | ........ | ........ | *4,150,500 | 10,420 |
| Totals | $9,421,660 27 | $7,195,138 42 | ........ | ........ | ........ | ........ | 493,972 |
| Total Real and Personal | ........ | ........ | ........ | ........ | ........ | $221,341,608 | |

Many of the counties have assets to meet a portion of their indebtedness, the aggregate value thereof being estimated at $2,450,000, which, deducted from the above figures, leaves a balance to represent the actual indebtedness of the counties of about $7,000,000. If to this be added the State debt, $4,700,000, and say $4,000,000 for debts due by cities and towns in their corporate capacity, and $1,000,000 for debts of counties omitted in the above table, we have a total indebtedness of nearly $17,000,000.

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* Real and Personal Property.

## FISHERIES.

The fisheries on our northwestern coast, and in the Arctic Ocean, are becoming a very important interest, having rapidly expanded within the past few years. The arrivals belonging to the whaling fleet during the year 1867 amounted to twenty-two, of which thirteen were from the Arctic Ocean, seven of these vessels belonging to the port of San Francisco. The product of the catch for the season consisted of 13,149 barrels of oil, and 186,600 pounds bone, showing an average of 600 barrels oil and 8,500 pounds bone to each vessel. There were twenty-six arrivals in 1866, bringing 15,000 barrels oil and 220,000 pounds bone; and twenty arrivals in 1865, with 11,320 barrels oil and 114,000 pounds bone. The most of the fleet engaged in these northern waters were formerly in the habit of repairing to Honolulu for the purpose of making sale or re-shipment of cargo and obtaining supplies. For several years past more of them have made San Francisco their place of rendezvous, and it is altogether probable that the number repairing to that port will be annually increased hereafter.

The first adventure from San Francisco, in the cod fisheries of the north, was made in 1862. Three years later seven vessels were engaged in the business, the number having been increased to eighteen in 1866. In 1867, twenty cargoes were received at San Francisco, one vessel having made two trips during the season. All these vessels but two were fitted out at the port last mentioned. The number of fish caught during the latter year was 943,400, amounting to 1,183 tons, dried fish. In 1866 there were eighteen arrivals, bringing 724,000 fish, amounting to 902 tons of the dried article; the arrivals in 1865 having been seven—number of fish taken, 469,400—tons dried, 537. The time consumed in making the round trip by these vessels, in 1867, ranged from ninety-five to one hundred and ninety-three days.

## IMMIGRATION.

Almost every chapter in this volume may be said to contain something pertinent to the question of immigration. In fact, all that has been written about the soil, climate, agricultural advantages, rate of wages, manufacturing and mining industries, and almost every other leading topic treated of in these pages, may be considered as having a direct bearing on this subject; therefore, we will not pursue it further in this place than to say the present seems an auspicious season, inviting general emigration to California. Every industrial interest is at this time exceedingly prosperous. Farming in all its branches, of grain, fruit, grape, wool, and cattle growing, has paid munificently for several years past, having, to all appearance, an equally prosperous future before it. Lands of good quality, unless sought after in the immediate vicinity of San Francisco, are cheap and procurable on easy conditions ; the opportunities for making money in the mines are still excellent, while labor of nearly every kind is in demand at liberal prices, which the prospective requirements for railroad construction promises to sustain for a long time to come. The rates of passage by the several steamship lines are extremely low, the transit being made with expedition, comfort, and safety. The various overland routes are also in better condition for travel than ever before, the more central being settled up for a long stretch at each end, with numerous towns and stations at intervals along it, enabling the emigrant to obtain supplies without carrying them as formerly all the way through. There will, moreover, be but little to fear from Indian molestations on this route hereafter. To such, then, abroad, as may entertain the idea of an early change of locality, or who may ever have contemplated a removal to California, it may be said that the present is every way an opportune moment for emigration to this State.

## POPULATION, VOTERS, RACES, ETC.

According to a semi-official enumeration, more recent than any in this work heretofore alluded to, the population of California, all classes included, may be set down at about 550,000, of which about 350,000 are males; the preponderance in favor of this sex being much less now than it was twelve or fifteen years ago. Of the entire number of inhabitants, fully one fifth consist of children under eighteen years of age. The population of the State is composed of the various races in about the following proportions: white, 478,000; colored, 5,000; Chinese, 60,000; domesticated Indians living in families, about the towns or on reservations, 4,000; and wild Indians, 3,000.

A just apportionment of the voting population, numbering about 130,000, would give to the several nationalities composing it something like the following figures: native born Americans, 85,000—55,000 from the free and 30,000 from the former slave States; Germans, Swedes, Danes, Russians, etc., 20,000; English, Scotch, and Welsh, 5,000; Irish, 15,000; French, Italians, Spanish Americans, etc., 5,000.

Of the Chinese population, it is estimated that about thirty-eight or forty thousand find employment in working such mines as have generally been abandoned by the whites; about eight thousand of their number having also been engaged for the past few years as common laborers on the Central Pacific railroad. Of the balance, some are scattered over the country, or, remaining in the cities and towns, are employed as cooks or in more menial capacities; a few hundred find service in our woolen mills and similar establishments, while a considerable percentage carry on laundries on their own account or engage in trade, gardening, or other pursuits, their customers in these latter branches being found mostly among their own countrymen. In some respects they have proved a useful class, inasmuch as certain of our manufacturing industries could not without their aid have obtained a foothold thus early; nor but for this could the Central Pacific railroad, an enterprise vital to every interest in the State, have been pushed forward with the speed it has been; not so much, in the latter case, from their cheapening labor as in their filling a demand that must otherwise have remained, at least for the time being, unsupplied. But, notwithstanding the useful purpose they have served in this connection, a strong feeling of dislike, not to say hostility, is entertained towards this people, especially on the part of the laboring classes—a feeling which, it is but just to say, has sprung as much from the natural antagonism of the races as from any apprehended reduction of wages likely to be effected by the presence of these Asiatic competitors in the labor market. What shape this vexed question is likely to take is at this juncture difficult to predict; though, from the fact that both those who favor, and those who oppose their admission into the State, have some sound reasons to sustain their views, it seems destined to be a disturbing element for some time to come.

## LIBRARIES, LITERATURE, JOURNALISM, ETC.

There are thirty-one libraries in California, containing each 1,000 volumes or more, and an aggregate number of about 130,000 volumes. The largest of these institutions, the State Library, contains a little more than 30,000 volumes. In addition to the above, there are about forty smaller libraries in the State, belonging to the various towns, public schools, literary associations, etc., and containing from 300 to 1,000 volumes each, making a further aggregate of about 20,000 volumes. Besides these public libraries there are many reading rooms, where the leading journals, magazines and other periodical publications of the day are to be found—a vast amount of reading matter of this description being imported on every steamer arriving from the East.

There are two hundred and thirty-eight different newspapers and periodicals published in California, of which twenty-eight are issued daily; two, tri-weekly; five, semi-weekly; ninety-two, weekly; one, tri-monthly; one, semi-monthly; eight, monthly, and one, bi-monthly; besides which, five of the dailies issue steamer editions, and twelve issue weekly editions. Seven of these newspapers are published in foreign languages, two being in German, two in French, and one each in Spanish, Italian and Chinese. There are fifty-three different publications issued in San Francisco, five in Sacramento, and several other towns in the interior have two or more.

From the foregoing it will be seen that California contains a large number of newspapers in proportion to its population, the tastes and habits of the people inclining them to indulge in this style of reading more than any other. The liberal support bestowed upon this class of publications, and the lively interest evinced by their patrons in public affairs, have tended to impart to journalism in this State a high character for enterprise and ability; several of the leading dailies, both in San Francisco and in two or three of the interior towns, being conducted with a degree of energy, tact and talent that would do no discredit to the ablest journals in the metropolitan cities of the Atlantic States or Europe. Indeed, it may be justly said that some of these San Francisco papers are scarcely inferior in this respect to any published in these great centers of wealth and enlightenment.

While many meritorious and popular works have been produced by California authors, it can hardly be claimed that anything like a distinctive literature has yet been eliminated from the product of their labors, nor have their merits always met with that ready recognition even at home that is generally so freely accorded everything indigenous to the State.

The reason of this is found in the fact that so large a share of reading matter is imported from the East, to a want of permanent homes among the people, and to an absolute lack of population, and not so much to the absence of a fair proportion of appreciative readers; though California, no doubt, contains a large element which prefer the sensational and overwraught style of modern current literature to that of a more solid and useful kind. Still, several California writers have acquired more than a mere local reputation, not only in the walks of humor, poetry, and fiction, but also in jurisprudence, science, history, mathematics, etc., some of whose works have been accorded very honorable recognition in the world of letters.

The leading publishing houses in California are those of H. H.

Bancroft & Co., and A. Roman & Co. The following bibliographical table contains a list of the principal books issued from the press of this State, besides which there have been published great numbers of pamphlets on various topics, political, religious, economical, educational, etc., together with more than one hundred maps, all of more or less local, and some of general interest :

HISTORY—History of California; by Franklin Tuthill. Colonial History of California; by J. W. Dwinelle. A Youth's History of California; by Lucia Norman.

LAW—International Law, and Laws of War; by H. W. Halleck. Digest of California Reports; by H. J. Labatt. Probate Law and Practice in California; by D. P. Belknap. Civil Practice Act of California; annotated by Charles H. Parker. Mining Laws and Forms; by H. B. Congdon. Bancroft's New Law and Form Book; 3d edition. Forms and Use of Blanks; by R. W. Hent. Mining Claims and Water Rights ; by Gregory Yale. General Laws of California; compiled by Theodore H. Hittell.

MINING—Hand Book of Mining in the Pacific States; by John S. Hittell. Processes of Silver and Gold Extraction; by Guido Kustel. Sulphurets; by W. Barstow. Concentration and Chlorination Processes; by Guido Kustel.

AGRICULTURE—Theory and Practice of Bee Culture ; by J. S. Harbison. California Silk Grower's Manual, by Louis Prevost. Grape Culture and Wine Making in California; by T. Hart Hyatt.

EDUCATIONAL—Instructions in Gymnastics; by Arthur and Charles Nahl. Clarke's New School Geography for Schools in the Pacific States; by Chas. Russell Clarke. Clarke's New Primary Geography. Elements of Composition ; by Augustus Layres. Belles Lettres; by Augustus Layres. Carrie Carleton's Letter Writer. Manual of Oral Instruction; by Laura T. Fowler. Common School Readings; by John Swett.

POETRY—Anselmo; by Geo. R. Parburt. The California Hundred; by J. H. Rogers. Outcroppings of California Verse. Poems ; by Sarah E. Carmichael. Poetry of the Pacific; edited by May Wentworth. Poesies; by Pierre Cauwet. Poems; by Chas. Warren Stoddard. The Lost Galleon, and other Tales; by F. Bret Harte. Poems; by John R. Ridge.

FICTION—In Bonds; by Laura Preston. The Greek Slave; by Ianthe. Leah's Confessions. Fairy Tales; by May Wentworth.

RELIGIOUS—The California Pilgrim; by Rev. J. A. Benton. Esther: the Hebrew Queen; by Rev. W. A. Scott, D.D. Samson: the Hebrew Hercules; by Rev. W. A. Scott, D.D. Synopsis of Jewish History; by Rev. H. A. Henry. Discourses on Genesis; by Rev. H. A. Henry.

DESCRIPTIVE.—Sonora; from the Spanish of Velasco. California Register; by Henry G. Langley. Bancroft's Handbook of the Pacific States, and Register of Facts; by Wm. Henry Knight. Descriptive Atlas of the Pacific States; by C. R. Clarke. Resources of California; by John S. Hittell.

MISCELLANEOUS—Geological Survey of California; by J. D. Whitney. Confucius, and the Chinese Classics; edited by Rev. A. W. Loomis. Financial Economy; by J. A. Ferris. Chinese and English Phrase Book; by B. Lanctot. Diseases of the Heart; by David Wooster, M. D. Bancroft's Map of the Pacific States; compiled by Wm. Henry Knight. Russian and English Phrase Book.

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